ARMY ANTHROPOMETRY AND MEDICAL REJECTION STATISTICS

By

FREDERICK L. HOFFMAN, LL. D.

Third Vice President and Statistician The Prudential Insurance Company of America, Member of the Committee on Anthropology and Chairman of the Sub-Committee on Race in Relation to Disease (Civilian Records) of the National Research Council, etc.

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(*5a*) The Mortality from Diseases of the Lungs in American Industry. 1916.

CHARTS (5½ x 8½ inches)

I Mortality from Cancer (21 charts).
II Mortality from Tuberculosis (21 charts).
III Mortality from Measles (6 charts).
IV Mortality from Whooping Cough (4 charts).
V Mortality from Accidents (24 charts).
VI Mortality from Typhoid Fever (1 chart).
VII Mortality from Infantile Paralysis (1 chart).
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XI Army Anthropometry (4 charts).

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ARMY ANTHROPOMETRY AND MEDICAL REJECTION STATISTICS

PART I

GENERAL

ARMY ANTHROPOMETRY

PART II

RECENT UNITED STATES ARMY MEDICAL AND REJECTION EXPERIENCE DATA

PART I

GENERAL ARMY ANTHROPOMETRY

URGENCY OF BETTER STANDARDS OF PHYSICAL EXAMINATIONS

The science of anthropometry or physical anthropology includes primarily the systematic examination and precise ascertainment of the physical characteristics of the human body. As a branch of anthropology, or the science of man in general, anthropometry concerns itself with the measurable aspects and proportions of the human body and the divergence from the normal averages according to climate, race, sex, social condition, etc. Physical anthropology has a literature of its own and a vast field of eminently practical and increasing application to social, industrial and military requirements. As observed by Seaver, "A determination of the laws of physical growth for the human animal has done more to correct educational methods than any other influence in pedagogy." Within recent years the physical fitness of men, women and young persons for highly specialized labor functions has become clearly recognized by the industrial physician responsible for the maintenance of the highest degree of health and efficiency in the operation of industrial plants. The term "anthropometry" was coined by Quetelet, but in its broader significance the work of the anthropometrician and the physical examiner represents rather the field of physical anthropology than a highly specialized branch of human anatomy and the practice of medicine as a healing art. Osteology constitutes the major portion of the basic and measurable material in physical anthropology, chiefly, of course, the skeleton, the size and relative proportions of which vary widely according to age, sex, race, etc. * The correlation of skeletal proportions to the physiological and pathological characteristics of the human body has not as yet been ascertained to the degree of scientific exactitude required to justify definite conclusions on many questions of serious concern to both the physician and the physical anthropologist. A successful adaptation of the human machine to the always more or less highly complex requirements of modern social and economic life

* The principal works on general anthropology utilized in connection with this investigation are the following: Anthropology, by P. Topinard, translated by R. T. H. Bartley, London, 1878; Manual of Anthropometry, by C. Roberts, London, 1878; The Study of Man, by Alfred C. Haddon, New York, 1898; The Races of Europe, by William Z. Ripley, New York, 1899; Skeletal Remains in North America, by Ales Hrdlicka, Washington, 1907; The Human Species, by Ludwig Hopf, London, 1909; Pedagogical Anthropology, by Maria Montessori, New York, 1913; The Races of Man, by J. Deniker, New York (n. d.).

is obviously a matter of the most urgent necessity in military service, in which the stress and strain upon organic functions are out of all proportion to the normal degree of endurance demanded by the exigencies of every-day labor and life. It has properly been observed by Lieutenant-Colonel Frank R. Keefer, M. D., an authority on military hygiene and sanitation, that "Not every man is suitable for a soldier," and "A man may be a good insurance risk and yet be entirely unfitted for military service." His conclusion, however, that only a small percentage are qualified is not in exact conformity to the facts of physical anthropology properly applied to the exceedingly complex requirements of the numerous branches of the military service which cannot possibly be standardized without a risk of substantial and even far-reaching errors in the selection of recruits or conscripts, as the case may be. As stated by Lieutenant-Colonel Keefer, "The number of men rejected for one reason or another, but chiefly on account of physical deficiency, greatly exceeds those accepted," and "only one in three or four is taken by officers on recruiting duty in cities, and this percentage is still further reduced by a rigid medical scrutiny at recruiting depots to which provisionally accepted applicants are sent prior to taking the oath of enlistment." It is the purpose of the present discussion to emphasize with the required brevity certain fundamental considerations of army anthropometry as a branch of the army medical service demanding decidedly higher average technical qualifications on the part of the examiner and the use of more strictly scientific methods and standards of measurement, with a due regard to the racial characteristics or inherited physical race traits of the recruit or conscript subject to examination and the risk of improper acceptance or rejection for military service, as the case may be. The observations by Keefer may be referred to as evidence to sustain this conclusion, for his views require only to be restated to emphasize their inherent limitations when applied to the end in view of the highest attainable ideal in the physical and medical selection of men for duty in the army and navy during a time of war. He remarks, "The *physical* deficiencies which cause the greatest number of rejections for our army are venereal diseases, heart abnormalities, defective vision and hearing, foot deformities and poor physique." Now, venereal diseases, of course, are pathological impairments, regardless of the fact that they cause physical deterioration or incapacity for service in much the same manner as any other diseased condition of the body, whether tuberculosis, typhoid fever, etc. To confuse venereal diseases with physical deficiencies of the body is as serious an error as to confuse organic defects of the lungs or heart with defects of lung capacity or heart function due to strictly physical and ascertainable causes.

THE EXAMINATION OF RECRUITS BY OFFICERS OF THE LINE

The practice which prevailed of having the preliminary examination of recruits for *voluntary* enlistment made by officers of the line temporarily assigned to recruiting duty cannot be defended as in conformity to the strictly scientific requirements of physical anthropology, which is as yet but an imperfectly developed branch of knowledge, a thorough understanding of which would prove invaluable, especially in the furtherance of the aims and ideals of preventive medicine. What represents normal men and normal proportions of bodily development and growth is neither adequately known nor adequately taught in even the best medical schools of the present day. Many of the most useful contributions to the scientific study of physical anthropology have been made by physicians, but the fundamental theory of anthropometry was worked out by Quetelet, a statistician and mathematician, and the largest body of trustworthy data was brought together by an astronomer, Mr. B. A. Gould, who secured approximately trustworthy measurements of bodily proportions of over one million of recruits during the Civil War.* Physical deficiencies and abnormalities are obviously matters of the utmost medical significance as regards appropriate methods of treatment and cure, or of rational adaptation to highly specialized needs. It would therefore seem unnecessary to re-emphasize the suggestion frequently made that the physical measurements of recruits or conscripts should be made by qualified physicians and not by laymen, least of all by officers of the line not thoroughly trained in the fundamental principles and methods of physical anthropology. From this point of view serious objection must be raised to the conclusion advanced by Lieutenant-Colonel Keefer that "While it is not to be expected that line officers on recruiting duty shall be able to detect obscure affections of the internal organs, there are many grosser defects which are *readily* apparent to them. Such are: Deformities, skin eruptions, pallor, emaciation, inebriety, venereal disease, defective development of parts, lice, dirty person, rupture, piles, stiff joints, varicose veins, flat feet, indecent tattooing, etc. Furthermore, internal disease may be suspected from shortness of breath, a thumping heart, dimness of vision, or irregular pulse following moderate exertion." It is only necessary to review this long list of more or less obscure physical or pathological conditions to emphasize the practical necessity that they shall be ascertained and passed upon as to their relative significance by a qualified physician and not by an officer of the line,

* Investigations in the military and anthropological statistics of American soldiers, by Benjamin Apthorp Gould, published for the U. S. Sanitary Commission, Cambridge, Riverside Press, 1869. See also Medical Statistics of the Provost-Marshal General's Bureau, compiled under the direction of the Secretary of War, by J. H. Baxter, A. M., M. D., Washington, 1875, 2 vols.; this report includes an elaborate outline of the plan and scope of the work, the instructions to recruiting surgeons issued by the various governments, an outline of the history of anthropometry, a review of the tables and their results, a series of charts and maps, and, finally, a number of special reports of boards of enrollment, and other documents.

however competent he may otherwise be for military duty. The medical significance of emaciation, venereal disease, rupture and even flat feet is by no means "readily apparent" in the large majority of cases. The ascertainment or even suspicion of shortness of breath, dimness of vision or an irregularity of the pulse is not within the province of the judgment of the average layman, however conscientiously he may apply himself to the duty of physical and medical examination assigned to him as a matter of army routine.

THE SPHERE AND FUNCTION OF PHYSICAL ANTHROPOLOGY

In the words of Dr. Ales Hrdlicka, in charge of physical anthropology at the Smithsonian Institution, "Physical, i. e., anatomical, anthropology is one of the main branches of the extensive science of mankind. It is that part of anthropology in which are studied variations in the human body and all its parts, and particularly the differences of such variations in the races, tribes, families, and other well-defined groups of humanity. Physical anthropology accumulates facts concerning these variations in every part of the earth and seeks their causes and significance. On the basis of such knowledge and with the help of other sciences it endeavors to trace man's evolution, to show his biological history, as well as the processes of differentiation actually going on in him, and to outline the tendencies of his physical life for the future." The inadequacy of our existing information on so important a branch of the extensive science of mankind was clearly brought out by Dr. Hrdlicka in an exhibit on physical anthropology contributed to the Panama-California Exposition in 1915. The most important scientific result of this exhibit was the emphasis placed upon the factor of individual physical variation, which comprises the differences among normal full-blooded representatives of one race or group, a difference which is regional as well as local, and extends from part to part of the body, being relatively limited in such characteristics as the color of the skin, eye or hair, but almost endless in the details of physiognomy and the various proportions of the body. The inadequacy of the existing amount of information on the physical anthropology of the civilized races is so much the more deplorable because the practical application of the data to such questions as the normal growth of children, the normal development of the body during early adolescence, the physical adaptation of workmen to highly organized industrial functions, and last but not least the physical requirements for military service depends for its best solution upon the ascertainment and perfection of normal bodily averages, which at present are wanting in scientific conclusiveness to a lamentable degree. * If, therefore, the measurements which

* The principal references, in addition to those previously quoted on general anthropology and anthropometry, are the following: On the Stature and Bulk of Man in the British Isles,

are being made and the physical and pathological facts which are being secured are deficient in the required degree of inherent accuracy, it is self-evident that one of the greatest opportunities for securing such information will be lost, if, in fact, it has not been entirely missed, in connection with the examination of the manhood of the nation, at ages 21 to 31, under the provisions of the Selective Draft.

RECOMMENDATIONS OF THE COMMITTEE ON ANTHROPOLOGY OF THE NATIONAL RESEARCH COUNCIL

The value of the opportunity for securing such information was clearly recognized by the Committee on Anthropology of the National Research Council, and repeated efforts were made to induce the army authorities to adopt a blank for examination purposes which would provide for all time a trustworthy return of the physical characteristics of the age period when maturity has been reached and when the resulting information would be most useful for practical, medical and other purposes. The blank suggested to the authorities is appended to this discussion (Appendix A), but it is most regrettable that it should not have been adopted. The measurements which have been made or will be made in the case of millions of men will therefore be almost useless for scientific purposes and, there are reasons for believing, frequently misleading for the purposes of the Selective Draft to secure those best fitted for military service in the field. The new data, therefore, cannot be utilized to best advantage in the ultimate working out of trustworthy standards of height, weight and chest expansion, which are the three essentials insisted upon by army medical authorities. Indifference to the racial antecedents of the examined recruit or conscript, or, in other words, the race or country of birth of the parents of the person examined, precludes the practical utility of the new information, since, as presently to be shown, *the racial factor,* in height and weight, at least, is invariably of paramount importance.

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by John Beddoe, B. A., M. D., &c., London, 1870; Height, Weight and Chest Measurements of Soldiers, by Dr. H. Busch, Berlin, 1878; The Relation between Growth and Disease, by H. P. Bowditch, M. D., Philadelphia, 1881; Die naturliche Auslese beim Menschen, by Otto Ammon, Jena, 1893; The Range and Significance of Variation in the Human Skeleton, by Thomas Dwight, M. D., LL. D., Boston, 1894; Anthropometry and Physical Examination, by Jay W. Seaver, A. M., M. D., New Haven, Conn., 1896; Social Anthropological Studies, by Dr. W. Pfitzner, 1899; A Graphic Standard Table of Heights and Weights, by Oscar H. Rogers, M. D., 1899; Manual of Physical Measurements, by Wm. W. Hastings, Springfield, Mass., 1902; Essay on the Stature of Man at Various Epochs, by A. Dastre, from the Smithsonian Institution Report for 1904; Overweight and Underweight Statistically Investigated by Means of a Card System, by S. W. Carruthers, in Proceedings of the German Periodical for Insurance Sciences, 1907; Physical Growth and School Progress, by Bird Thomas Baldwin, Washington, 1914; Physical Anthropology in America, by Ales Hrdlicka, Panama-California Exposition Edition, Lancaster, Pa., 1914; Socio-Anthropometry, by B. L. Stevenson, Ph. D., Boston, 1916; Communication from Mr. Francis Galton on International Anthropometry to Sir Rawson W. Rawson, President of the International Statistical Institute; Zur Anthropometrie der Menschen Messkunst, by Dr. Engel, Director, Royal Bureau of Statistics of Prussia (n. d.); Meddelelser on Danmarks Antropologi (Communications on the Anthropology of Denmark), an annual report issued by the Danish Anthropological Committee on the anthropological survey of Denmark, Copenhagen, 1910-12; Military Anthropology, by Livi; Criminal Anthropology, by Lombroso; General Anthropology, by Enrico Morselli; Anthropology of Sweden, by Retzius and Fuerst, 1902.

THE NEED FOR A NATIONAL ANTHROPOMETRIC SURVEY

General averages of height, weight and chest expansion for a heterogeneous mass of men are as useless as general averages of wages, prices, etc., which are inapplicable as a rule to individual cases. The investigations by Gould during the Civil War constitute for this reason an extremely valuable basis of trustworthy information concerning the physical characteristics of American manhood with a due regard to race. If corresponding information could have been obtained in response to the urgent appeal * of the Committee on Anthropology of the National Research Council and other interests concerned with the practical use of such data, there would have been secured a proper basis for comparison of the past with the present, and extremely important questions concerning national vitality, physical progress or deterioration, etc., would have been brought measurably nearer to a successful conclusion than is now likely to be the case for many years to come. The expense involved would have been slight, the additional labor would have been of no material significance, the standard instruments required would have been useful for the future, and the slight amount of preliminary scientific training would have materially increased the ability of the medical examiner charged with the highly responsible duty to so measure and examine the recruit or the conscript that no injustice would be done to the nation or to himself in his wrongful acceptance or rejection for military service. The practice at the present time in the preliminary examination of recruits and even in their subsequent examination by medical men falls often far short of the required high standard demanded by urgent military and general considerations. The extensive literature of the subject bears intrinsic evidence of superficial consideration, with the one important exception of the work by Sir William Aitken, on "The Growth of the Recruit and New Soldier, with a View to a Judicious Selection of 'Growing Lads' for the Army, and a Regulated System of Training for the Recruits," published in 1887, which is not critically referred to by a single American authority on military hygiene or the army medical service; nor is reference made to the best American authorities on anthropometry, particularly "Anthropometry and Physical Examination," by Jay W. Seaver, published in New Haven, 1896, intended for practical use in connection with physical education and physical examination of college students or men of that period of adolescence which just precedes early manhood, and upon whom the heaviest military demands are naturally made. †

* The report had been reprinted from the Proceedings of the National Academy of Sciences, Vol. III, August, 1917.

† Some exceptionally valuable observations on growth and the development of muscle power, with special reference to physical education and the diseases of adolescence are contained in a brief treatise on "The Adolescent Period," by Louis Starr, M. D., Philadelphia, 1915. See, also, "The Problem of Age, Growth and Death," by Chas. S. Minot, LL. D., New York, 1908.

RULES FOR THE PRELIMINARY PHYSICAL EXAMINATION

The rules governing in the examination of recruits have been revised from time to time, but in the main the changes until very recently have been of relatively slight importance. The preliminary physical examination of the recruit is generally by a line officer, who is required to proceed in the following order:

> First, test the applicant's vision; second, test his hearing; third, strip him of all clothing and inspect his general physique and appearance; fourth, take his height, weight, and chest measurements; fifth, require him to perform the exercises prescribed in paragraphs 16 to 19, inclusive, of these rules; sixth, make a special examination of the various parts of the body in the order and to the extent prescribed in paragraphs 21 to 36, inclusive, of these rules. The applicant must be entirely nude during the whole of this examination after he has been subjected to the tests of vision and hearing.

As far as known, the examining officer of the line is not required to undergo a course of special instruction in methods of physical examination, so that merely accuracy in observation, good judgment and strict conformity to thoroughly standardized requirements are relied upon for satisfactory results. Considering special aspects of the examination, it must be apparent that in many cases an officer of the line may be far from qualified to ascertain accurately the visual acuity of an applicant for military service, or his hearing or his general physical proportions in so far as they may possibly indicate more or less obscure departures from accepted standards. The present practice is a survival of the earlier methods of recruiting, when the main object of the examination was to exclude applicants obviously unsuitable, often on moral or intellectual grounds. Considering, for illustration, such a delicate procedure as chest measurement, it is required, according to the official instructions, that

> The applicant will be made to stand erect with his heels together and to raise his arms over his head. The measuring tape will be carefully adjusted around the chest with the upper edge of the tape just below the lower angles of the shoulder blades behind and the nipples in front. The arms of the applicant will then be dropped to the sides and he will be directed to take several deep breaths to verify the maximum and minimum measurements. Care must be taken not to displace the tape and to avoid muscular contortions. Many men must be taught how to breathe and to expand the chest before the measurements are taken, and consequently great care and patience are often necessary in order to get correct results.

This is merely one of many indications that the functions of the examining officer of the line conform more to those of a medical examiner, whose judgment would unquestionably be more conclusive and trustworthy than that of even the most careful and painstaking non-medical observer.

INADEQUACY OF EXAMINATIONS BY OFFICERS OF THE LINE

This conclusion adverse to the present practice of preliminary examination by non-medical officers * applies with special force to the examination of special parts, such, for illustration, as the examination of the skin for evidences of disease, ulcers and eruptions, extensive, deep and adherent scars, extensive or disfiguring birthmarks, hypodermic scars, indicating a drug habit, etc. With reference to the examination of the eyes, the attention of the non-medical examiner is directed to possible evidences of chronic inflammations, triangular or fan-shaped growths on eyeball with the apex encroaching upon the cornea, marked squint, and drooping of the upper lid. The nose is required to be examined for dilated vessels, indicative of alcoholism, for disfiguring deformities, for offensive discharges, and for inability to breathe freely through the nose and with the mouth closed. The neck is required to be examined for goitre, enlarged or suppurating glands and their resulting scars. The chest is required to be examined for malformations; the abdomen for obesity, dropsy, ruptures, and with collateral questions regarding a possible past history of chronic dyspepsia or dysentery. Rupture is made a subject of special instructions, and the applicant is directed "to stand with his feet apart and his arms raised above his head, while the examiner is required to instruct him to cough, the examiner placing the tip of his forefinger at the point of suspected rupture, etc. The back is required to be examined for deformities and malformations; the groins for enlarged glands; the hands and arms for deformities, old fractures and dislocations, stiff joints, etc.; the feet for flatfoot, deformed toes, etc., and finally, the applicant is required to stand "with the inner borders of his feet together, arms horizontal, fingers apart, and eyes shut to submit to an inspection for tremors and instability indicating alcoholism or nervous disorders."

It is not made entirely clear by the regulations what precise method of procedure is to be followed by the non-medical officer in the final rejection of recruits. There is apparently a distinction drawn between applicants for enlistment who are not acceptable to the recruiting officer before being examined physically and those who are rejected by him subsequently to their physical examination, more or less in conformity to the preceding outline, which is largely based upon the revision of Tripler's Manual by Major and Surgeon Charles R. Greenleaf, issued in 1890. The *Rules for the Examination of Recruits* as issued in the form of General Orders No. 66, Washington, April 18, 1910, and re-issued in 1916, proceed with the instructions for the examination from the non-medical portion as made by the line officer to the

* These observations, of course, have reference only to the examination of recruits under the former system of voluntary enlistment and they do not apply, unless otherwise stated, to the examination of registrants under the Selective Draft.

medical portion as made by the medical officer without an explanation in detail as to the limitations of the functions of the former and the full authority of the latter, especially as regards a review of evidence more or less medical, although obtained by a non-medical officer of the line. The instructions to the medical officer are merely amplified in important matters of detail, but in a general way conform to most of the essential requirements as regards the non-medical physical examination of the recruit by an officer of the line. With reference to the medical examiner, however, it is suggested that use be made of "every possible diagnostic procedure at his disposal, including the use of the microscope, the X-ray, and other laboratory methods, for the determination of doubtful cases, and he may admit such cases to a hospital for study and observation for a reasonable period in order that a definite conclusion may be reached with regard to them."

Diseases, injuries, malformations and other physical defects disqualifying for military service are briefly enumerated as follows:

A superficial examination of many applicants determines the fact of their unfitness; they are undersized, underweight, undeveloped, sallow, or pale and scrawny, poorly nourished, with thin, flabby muscles, and are manifestly lacking in stamina and resistance to disease. The rejection of such applicants for "poor physique" is not sufficiently exact, and the medical examiner should record as the disqualifying cause in each case some specific pathological condition, if such can be found, or "underweight," "deficient chest measurement," "deficient muscular development," "deficient nutrition," or such other definite disqualifying conditions as may be found to exist. Obesity is a cause for rejection when so marked as to interfere with marching or other military duties.

OBSCURE EVIDENCES OF PHYSICAL MATURITY

The indicated physical evidences of maturity for the guidance of medical officers are quite superficial and inconclusive. It has been properly pointed out by Sir William Aitken that "All the parts of the organization of man are connected or correlated together so that with the increase or decrease of the whole body, or any particular part of it, certain organs are also increased or diminished or modified; and modifications which arise during the earlier stages of growth tend to cause the subsequent development of the whole man." A much more qualified and extended review of this important aspect of the medical examination is given by Munson in his treatise on *Military Hygiene*, in part as follows:

From the standpoint of developmental anatomy the soldier should certainly not be enlisted before the age of twenty-one years, and a delay of an additional twelve months would not be undesirable. At eighteen years the bones are not fully formed and their actual growth continues until the twenty-fifth year, osseous development preserving a distinct and definite sequence. The epiphyses of the transverse and spinous processes of the vertebrae hardly commence to ossify before sixteen years of age, and it is not until after twenty years that the two thin circular plates form on the bodies of the vertebrae, while the whole process is not completed until the thirtieth year. The sacrum commences to consolidate at the eighteenth year and the process is completed from the

twenty-fifth to the thirtieth year. The fourth and third bones of the sternum are united between the twentieth and twenty-fifth years, and the second is not united to the third bone before the thirty-fifth year. The epiphyses of the ribs commence to grow between the fifteenth and twentieth and are not completely joined to the bone until the twenty-fifth year. The epiphyses of the scapulae join between the ages of twenty-one and twenty-five; while the epiphysis of the clavicle begins to form between the ages of eighteen and twenty years. The internal condyle of the humerus unites at eighteen, but the upper epiphysis does not join until the twentieth year. The epiphyses of the radius, femur, tibia and fibula are all unjoined at eighteen years and are not completely united until the twenty-fifth year. The epiphyses of the pelvic bones (crest of the ilium and tuberosity of ischium) begin to form at puberty and are completed by the twenty-fifth year. The greatest growth of the heart takes place between eighteen and twenty-five years and even at the latter age has not attained its maximum. When cardiac development is deficient, heart failure is liable to occur under unwonted exercise and in emergencies, and irritable heart, unfitting for military service, is thus favored.

These observations are, broadly speaking, in entire conformity to modern teachings of anatomy and physiology and to the earlier general conclusions of Aitken, whose descriptive account of the "progressively gradual development and growth of the recruit and the young soldier" continues to the present time as a most reliable guide to the examiner, whether an officer of the line or a thoroughly qualified officer of the medical branch of the army service.

STIGMATA OF DEGENERACY

The general rules for the examination of recruits are also somewhat obscure as regards the precise limitations upon the judgment which is required to be exercised in medical matters by the recruiting officer of the line. It is with reference to mental and nervous disorders, for illustration, that the rules read: "The recruiting officer should use every effort to exclude the mentally defective and those showing evidence of serious nervous disorders." It is assumed that the term "recruiting officer" has reference either to the line officer only or to the line officer and the medical officer as well. A list of the principal stigmata of degeneracy is given; but obviously, as made clear by the following extract, it would be quite out of the question for any one not thoroughly versed in anatomy or physiology to accurately ascertain and adjudicate the significance of these so-called "stigmata of degeneracy," the importance of which has been denied by so high an authority as Goring in his report on the Anthropometric Measurements of English Convicts.* The stigmata of degeneracy enumerated in the Rules for the Examination of Recruits are as follows:

Anatomical stigmata: Cranial abnormalities in outline, capacity, or dimensions; excessive development of the occipital protuberance and ridges, the frontal eminences, and the mastoid processes; reduction of the facial angle; asymmetrical facial development; lower jaw disproportionately large and

* Of special value is the schedule of measurements and general anthropological data on the English Convict, issued as a supplement to the report by Chas. Goring, M. D., London, 1913.

prognathic; hard palate sharply vaulted; dental arches narrowed or angular; teeth defective or misplaced; ears disproportionate in size or malformed; extremely refractive anomalies and strabismus; deviation of the nose; septal deformities; harelip; cleft palate; remnants of branchial clefts; spina bifida; sacral growths of hair; deep sternal furrows and concavities; disproportion between thorax and abdomen; upper and lower limbs disproportioned to each other or to the trunk; abnormality in size of hands or feet; tendency to left sided overdevelopment; deformities of the fingers; syndactyly; excessive length or shortness of the fingers; undersize of the ring and little fingers; genitalia undeveloped; hypospadias; epispadias; scrotal fissure; albinism; melanism; multiple naevi; defective development of hair and nails.

With reference to these alleged stigmata of degeneracy a supplemental ruling reads that "The degenerate physique as a whole is often marked by diminished stature and inferior vigor; males may present the general body conformation of the opposite sex, with sloping, narrow shoulders, broad hips, excessive pectoral and pubic adipose deposits, with lack of masculine hirsute and muscular marking." In addition thereto, functional stigmata are defined as "defective mental qualities; moral delinquencies, such as wilfulness, deceitfulness, indecency, stammering," etc., but it is properly said with reference to the practice of estimating the value of the various marks of degeneracy that "the occurrence of a very few in any individual case would not justify classification of the case as that of a defective." The notable work of Goring clearly brings out the danger of blind reliance upon so-called physical stigmata of degeneracy, criminality or perversion. Referring to the prevailing notion that "every individual criminal is an anomaly among mankind by inheritance and can be detected by his physical malformations and mental eccentricities," Goring concludes that "this anthropological monster has no existence in fact," and, furthermore, that the "physical and mental constitution of both criminal and law-abiding persons of the same age, stature, class and intelligence are identical." Inferior physique and defective intelligence unquestionably differentiate the criminal from the average normal population; but such "stigmata of degeneracy" as are referred to in the Rules for the Examination of Recruits are of very doubtful validity, especially when practically applied by those not thoroughly trained in psycopathy, which, as a rule, may safely be assumed not to be the case. There is therefore the serious danger that a considerable proportion of thoroughly eligible recruits may be rejected as unfit for military service for reasons which cannot possibly have any practical relation whatsoever to military efficiency.

LIMITATION OF ARMY REJECTION EXPERIENCE

The rejection statistics of the United States Army are quite difficult of correct interpretation. The term rejection in army recruiting has apparently quite a different significance from what it has in life insurance practice or in the physical examination of applicants for official

or private employment. A preliminary process of selection seems to prevail, the results of which are not included in the final statistics of recruiting as issued by the authority of the Surgeon General of the Army. Seriously erroneous conclusions are unavoidable unless the terminology in use is more precisely defined. According to the *Army and Navy Journal,* of January 10, 1914, for illustration, the total number of applicants for enlistment in the Army during 1913 in the Eastern, Middle, Southern and Western sections of the United States was as follows: In Chicago, 11,920 applicants for enlistment, with 9,342 rejections, or 78.4 per cent.; in New York, 17,055 applicants for enlistment, with 13,758 rejections, or 80.6 per cent.; in Savannah, New Orleans and Little Rock, 3,855 applicants for enlistment, with 3,011 rejections, or 78.1 per cent.; in San Francisco, 5,504 applicants for enlistment, with 4,443 rejections, or 80.7 per cent. The *Journal of the American Medical Association,* under date of January 31, 1914, in commenting upon these data, remarks that "It will be seen from these figures that the percentage of rejections was about the same in New York and San Francisco, and that the percentage for the Southern section and the Middle West as represented by Chicago was lower than either the East or the West, with a small fraction in favor of the more northerly section. The better showing of the Middle West was rather to be expected, though the margin is quite small; but the surprising thing about all these figures is the large percentage of rejections in all sections of the country. It does not argue well for the physique and the stamina of our young men, or perhaps may be accounted for by the supposition that the best do not offer themselves for enlistment. It is said, in England, that the physique of the average recruit is deteriorating, but in a comparatively new country, like the United States, the descendants of hardy pioneer stock, reared amid abundance and under favorable health and climatic conditions, should make a much better showing." The question therefore arises as to whether the preceding rejection data have the significance attached to them or whether they may not be, as they probably are, seriously misleading. The rejection ratio in all probability merely represented the results of a preliminary process of selection without specific or qualified reference to the supreme question of physical stamina and disease as well as fatigue resistance.

RECRUITING EXPERIENCE UNDER VOLUNTARY ENLISTMENTS

During the period 1913-15 in the recruiting districts of the United States Army there were thus examined 461,033 applicants for military service, of whom 349,975, or 75.9 per cent., were declined, while 111,058, or 24.1 per cent., were provisionally accepted. Of the 111,058 it appears only 92,667 were subsequently medically examined at recruiting depots,

and of this number 13,884, or 15 per cent., were finally rejected and 78,783, or 85 per cent., were finally accepted. At depot posts 9,110 applicants were medically examined, and of this number 800, or 8.8 per cent., were rejected, while 8,310, or 91.2 per cent., were finally accepted. In addition thereto, at other military posts or in the field, 26,422 applicants were examined, and of this number 669, or 2.5 per cent., were rejected, and 25,753, or 97.5 per cent., were finally accepted.

The initial rejection of 75.9 per cent. of the applicants for military service in the United States Army by non-medical officers of the line can therefore not be construed as evidence of deficiency in physical stamina or lack of resistance to disease or fatigue. Many applicants were declined, in all probability, for defects or deficiencies, physical, mental or moral, each without a very decided bearing upon the question of physical strength and power of endurance. All army experience under a voluntary system proves conclusively that a large number of young men apply who obviously are not required as long as the authorized military strength can be easily maintained by means of the most careful medical selection, as a guarantee that only the best fitted will be secured. The applicants for voluntary military service in the recruiting districts are generally without any previous military experience or training whatever, the applicants examined at depot posts and other military posts are chiefly, if not exclusively, those who have had previous military training; those, in other words, who represent a class eligible for re-enlistment. When the latter two groups are combined, it appears that of 35,532 such applicants examined only 1,469, or 4.1 per cent., were rejected, while 34,063, or 95.9 per cent., were accepted.

INCONCLUSIVE STATISTICS OF PHYSICAL DETERIORATION

The foregoing observations emphasize the urgency of extreme care in the use of army recruiting data for other than military purposes. The misuse of such data is of common occurrence, regardless of the intimations in practically all the text books or discussions on recruiting that the experience is governed by military considerations and has no very definite, if any, relation to possible changes in the physique or bodily proportions of the population considered. Among other conspicuous illustrations of the misuse of the comparative method, appropriate reference may here be made to the statement of a well-known actuary before the House Committee on Labor with regard to the effects of social insurance in Germany on the physique of the German adult population. The argument was advanced that, according to military statistics, in consequence of compulsory social insurance there had been a very substantial improvement in the height and weight of those conscripted for military service. The foremost German authority on

the subject in commenting upon the German recruiting statistics historically reviewed for a long period of years observes more than once that the changes in the bodily proportions, chiefly as regards height and the ratio of rejection, must not be accepted as evidence of material physical alterations, but rather as being governed primarily, if not exclusively, by changes in standards of selection. In contrast, a well-known Presbyterian minister in an address delivered on the occasion of the first Congress on Race Betterment advanced the conclusion that the British recruiting statistics for a hundred years indicated a very considerable diminution in stature and presented otherwise evidence of physical deterioration. The statement was in conflict with the evidence collected by the Inter-Departmental Committee on Physical Deterioration, which drew attention to the opinion of Prof. Cunningham that "perhaps the most unreliable evidence is that which is obtained from the recruiting statistics," for, it is explained:

> The class from which the recruits are derived varies from time to time with the conditions of the labor market. When trade is good and employment plentiful it is only from the lowest stratum of the people that the Army receives its supply of men: when, on the other hand, trade is bad, a better class of recruits is available. Consequently the records of the recruiting department of the Army do not deal with a homogeneous sample of the people taken from one distinct class.

To much the same effect was the evidence of the Director General of the Army Medical Service, Sir W. Taylor, who, according to the report, "most emphatically disclaimed any responsibility for the deductions that had been drawn from the figures published by his department," and who "appeared to attach very little value to the figures," and in reply to a question calling attention to a passage in the Report of the Inspector General of Recruiting, where that officer speaks of the gradual deterioration of the physique of the classes from which recruits are principally taken, he said, "He is not justified in that. We have no data on which to form that opinion." Unless, therefore, the strictly military nature of recruiting statistics is kept in mind, erroneous conclusions are practically unavoidable, for a full understanding of such statistics requires an exhaustive study of army rules and regulations extending over a long period of years, and a reasonably thorough knowledge of the exceptions granted in conformity to the special authority vested in the Adjutant General.

CONFLICT OF MEDICAL AND NON-MEDICAL CONSIDERATIONS IN RECRUITING

It may also be pointed out that while non-medical officers of the line employed in connection with the examination of recruits are not expected to express a medical judgment on such defects as errors of refraction of the eye, valvular lesions of the heart, tuberculosis of the lungs, Bright's disease, or other obscure internal affections, they are

specifically reminded in the book of Rules for the Examination of Recruits that these affections usually give rise to signs such as defective vision, shortness of breath, emaciation, and tumultuous beating of the heart, which the recruiting officer should detect and which are causes of rejection. In proportion, therefore, as non-medical officers are governed by semi-medical instructions and are desirous of avoiding possible defects disclosed by a subsequent medical examination, the ratio of primary rejections must vary considerably.

In this connection the observations of Dr. Edward L. Munson * are of interest. He remarks that:

> Of the applicants for enlistment a considerable proportion are summarily rejected by recruiting officers, prior to any physical examination, by reason of intoxication, obvious defect of body or mind, or on account of apparently undesirable personality. Such rejections are not made a matter of official record. Of those admitted to the physical examination only about one in four has been found in times past to be qualified for the military service.

He also directs attention to the fact that during the period 1889-93 the total number of applicants physically examined was 101,432, and that of this number 85,136, or 83.9 per cent., were rejected. In explanation of the excessively high ratio of rejections he observes that during more recent years "the physical attributes of the classes from which the recruits were derived appear to have undergone a steady improvement." And referring to the year 1897 he states that the ratio accepted was 70.2 per cent., or differentiating the two races the ratio of accepted recruits was 78.7 per cent. for the whites and 69.5 per cent. for the colored.

The foregoing observations indicate that for practical purposes the rejection of recruits on primary examination by non-medical officers of the line is quite inconclusive, the rejections being interdependent with the technical qualifications of the examiner and his predilection for special indications of deficiency or unsuitability for military service, on the one hand, and the specific rules and regulations as well as the authorized strength of the army, on the other. Munson quotes Marshall as authority for a grouping of the causes on account of which recruits are rejected, as follows:

> 1st. Diseases or deformities which a medical man from his professional training and acquaintance with the duties of the soldier considers are infirmities which disqualify men for service in the army.
>
> 2nd. Slight blemishes which do not disqualify a man for the army but which an unwilling soldier may exaggerate, and allege that he is thereby rendered unfit for military duty.
>
> 3rd. Unimportant details or deviations from symmetry, or slight variations from the usual form or condition of the body—technical or nominal blemishes which do not incapacitate a man for the army or in the slightest degree impair his efficiency.

* "The Theory and Practice of Military Hygiene," by E. L. Munson, New York, 1901, page 30.

Munson also refers to Greenleaf as authority for the statement that:

> Experienced surgeons will reject all recruits whose defects fall under the first two headings from a conviction that they render the men unfit or undesirable for the army; but those under the third head are frequently rejected from fear of responsibility, a dread of official correspondence and to an ultimate damage of professional character.

It is therefore self-evident that the rules and regulations which govern in the examination of recruits, whether non-medical or medical in a time of peace, and chiefly with reference to voluntary enlistment, yield results of very limited scientific value. In a time of war, according to Munson, those coming under the first of the three preceding groups should be excluded, while those coming under the second and the third should be as rigidly held in the service. In other words, widely different points of view prevail in the selection of recruits for military service during times of peace and during times of war, and unless this fact is kept carefully in mind, the statistics extending over a long period of years are most likely to be seriously misleading.

A DECADE OF UNITED STATES RECRUITING STATISTICS

Limiting the observations for the time being to *medically* examined applicants for military service, subjected to a previous process of elimination by non-medical officers of the line, the table following is of interest as illustrating the changes in the rejection rate during the last decade, for which the information is available in detail:

RECRUITING EXPERIENCE OF THE UNITED STATES ARMY
(White and Colored)
1906–1915

Year	Examined	Rejected	Rate per 1000
1906	25,022	5,625	224.8
1907	33,864	3,110	91.8
1908	54,885	7,434	135.5
1909	23,520	3,356	142.7
1910	25,133	2,378	94.6
1911	50,534	4,576	90.6
1912	32,738	3,960	121.0
1913	36,822	4,952	134.5
1914	57,244	6,102	106.7
1915	37,993	4,781	125.8
1906–1910	162,424	21,903	134.8
1911–1915	215,331	24,371	113.2

According to this table the maximum rejection rate occurred in 1906 or 22.5 per cent., and the minimum in 1911, or 9.1 per cent. Without an analysis in full detail of the individual causes of rejection a final conclusion, of course, would not be justified, even as to the most general

reason underlying this wide variation in the non-eligibility of applicants for military service during a period of peace.*

The army rejection rate is governed not only by physical and medical considerations but also by the numerical requirements of the service, primarily the permissible maximum of enlisted strength. The preceding table is an excellent illustration of the very limited value of recruiting statistics in efforts to prove that there has been physical progress or deterioration, as the case may be. For such a profound range in the rejection rate as is here indicated could not, of course, have any definite relation whatever to the actual physical conditions of the population concerned.

In amplification of the preceding table for both the white and the colored troops, combined, the following table is included, exhibiting the results separately for the two races:

RECRUITING EXPERIENCE OF THE UNITED STATES ARMY
(White and Colored)
1906-1915

	WHITE			COLORED		
Year	Examined	Rejected	Rate per 1000	Examined	Rejected	Rate per 1000
1906	*24,259	5,484	226.1	763	141	184.8
1907	32,199	2,948	91.6	1,665	161	97.3
1908	52,740	7,218	136.9	2,145	216	100.7
1909	22,613	3,243	143.4	907	113	124.6
1910	23,788	2,295	96.5	1,345	83	61.7
1911	47,980	4,382	91.3	2,554	194	76.0
1912	30,374	3,680	121.2	2,364	280	118.4
1913	33,828	4,594	135.8	2,994	358	119.6
1914	53,970	5,717	105.9	3,274	385	117.6
1915	35,533	4,496	126.5	2,460	285	115.9
1906–10	155,599	21,188	136.2	6,825	715	104.8
1911–15	201,685	22,869	113.4	13,646	1,502	110.1

*Figures represent recruits examined up to July 31, 1906.

According to this table the rejection ratio was, as a rule, higher for the white than for the colored, although, as is well known, the average American negro is of a distinctly lower degree of physical resistance to disease than the average white man.

IMPORTANT CHANGES IN RECRUITING STANDARDS

Changes in recruiting standards are, therefore, of the first importance in connection with the practical use of recruiting statistics. According to Munson, "The minimum limit of stature for the recruit has varied greatly in our service. Shortly after the Revolution it was fixed at

* These statistics must not be confused with the corresponding returns of the Adjutant General of the Army, as given on page 85.

5 feet 6 inches, and in 1835 a minimum of 5 feet 8 inches for infantry was required. In 1838 it was reduced to 5 feet, but this was increased by 5 inches three years later. Before the end of the Civil War it was again reduced to 5 feet. At present (1916-17) it is placed at 5 feet 4 inches for all branches of the service, although recruiting officers are allowed to exercise their discretion as to the enlistment of desirable recruits (such as band musicians, school-teachers, tailors, etc.) who may fall not more than a fraction of an inch below the minimum standard of height. The above requirement for height is, however, subject to change, instructions to that effect being issued from the Adjutant General's office from time to time as the requirements of the service may dictate." According to the same authority, in foreign armies about 1900 the minimum height of soldiers was as follows:

MINIMUM HEIGHT OF RECRUITS IN FOREIGN COUNTRIES
(Munson)

	Inches		Inches
English	63.8	Swiss	61.0
Swedish	63.0	French	60.6
German	61.8	Russian	60.2
Belgian	61.8	Spanish	59.1
Italian	61.4	Portuguese	59.1
Austrian	61.4		

These variations in prevailing minimum standards of stature have a direct bearing upon the more or less important differences in the rejection rate of the recruiting service of the different countries.

CHANGES RECOMMENDED BY THE COMMITTEE ON ANTHROPOLOGY OF THE NATIONAL RESEARCH COUNCIL

In full appreciation of the practical as well as general scientific importance of precise anthropometric and other measurements of the men of the new National Army, the Committee on Anthropology of the National Research Council presented a number of suggestions to the National Academy of Science and through the National Research Council to the Council of National Defense. The suggestions considered (1) the examination of recruits, (2) modification of stature requirements, (3) further anthropometric work for statistical and scientific purposes at the concentration camps, and (4) material for future scientific research. The communication was signed by Prof. W. H. Holmes, Chairman, and the members of the Committee, Prof. C. B. Davenport, Dr. Frederick L. Hoffman, Dr. G. M. Kober, Dr. Ales Hrdlicka, Mr. Madison Grant, Mr. E. A. Hooton, and Dr. Tom A. Williams. With special reference to modification of stature requirements, it is first pointed out that the minimum requirements of stature in any branch of the Army and Navy (at the time the sugges-

tions were submitted, August, 1917), was 5 feet 4 inches. In further explanation of the suggestions it was said that:

> The minimum for the English infantry and some other branches of the service prior to the present war was 5 feet 2 inches, and it has since been reduced. On the Continent the minimum differs with the nationalities, but is as a rule lower than that of the United States. In many of these nationalities the average height of the male does not reach, barely equals, or only slightly surpasses the minimum requirement for the soldier of the United States. Many of these nationalities are well represented in this country. They include Italians, Greeks, French, Mexicans, Spanish, Swiss, the Russian and Austrian Jews, many of the Slavs, the Magyars, Roumanians, Lithuanians and even Germans. Should the present minimum in stature for the United States Army and Navy be rigidly adhered to, from one-fourth to one-half of the men belonging to or descending from the nationalities mentioned would be excluded by this rule alone, thus resulting in serious disadvantages, the chief among which would be that of placing a disproportionate burden in the formation of the army on the naturally taller native American.

RACE IN RELATION TO NORMAL STATURE

In view of the fact that small stature in a large majority of cases signifies normal variation and not weakness or degeneration, as has repeatedly been proved by certain regiments of short stature of England and other short stature troops of European countries, the Committee recommended that "the minimum stature requirement for the new United States Army be reduced, for all branches of the service, to 60 or at most 62 inches; and that corresponding with this, the minimum weight requirement be reduced from 128 to 120 pounds." These recommendations were subsequently adopted by the Chief of Staff. The practical importance of the adoption of this recommendation is one of far-reaching significance, on account of the vast immigration from Southern Europe during the last thirty or forty years and the fact that the Army will include a considerable number of men of American birth of South-European parentage. Practically all South-Europeans are of a lower stature than the northern races of Europe or the United States. In forwarding the suggestions and recommendations, these fundamental facts of physical anthropology were emphasized by Dr. Hrdlicka and amplified by a table showing approximately the average height of European nationalities, exhibiting an average stature as low as 63.7 inches in the case of Magyars, 64.1 inches in the case of Russian Jews, 64.7 inches in the case of Italians, and 64.8 inches in the case of Austrian Slavs. All of these racial elements form constituent parts of the new National Army. Their unnecessary rejection on the basis of the former minimum stature would have been a foregone conclusion. The average height for certain races is frequently more or less misleading and often useless for practical purposes. The typical frequency distribution of stature is, however, of decidedly greater scientific value; and as a useful contribution to a better understanding of this important aspect

of army recruiting a series of tables and frequency curves has been prepared for European conscripts and American recruits. A few typical frequency curves of stature, for the purpose of convenient illustration, have been worked out for me by Mr. Arne Fisher, the well-known author of a standard treatise on "Probabilities." The point of view that the mean or average value of a large number of measurements may be relied upon unconditionally as a measure of comparison is a serious fallacy common in general statistical practice. The mean at best represents a norm around which the other values of the variate are grouped. The mean frequency gives not the slightest clue as to the possible *tendency* of the statistical material to cluster around a particular value which for practical purposes may be of governing importance. As pointed out to me by Mr. Fisher in his observations on the frequency curves of recruits that if, for illustration, the mean stature of American recruits and of Norwegian conscripts are 67.52 inches and 67.49 inches, respectively, we are by no means justified in assuming that the statures of the two populations are precisely the same, although the difference between the means is less than .03 part of an inch. It is quite probable that in the one we would find 70 per cent. having a stature between 65 and 70 inches, while in the other the percentage distribution would amount to only 55 per cent. The mean, under such conditions, is therefore often a fictitious mathematical measure which without qualification is practically certain to prove misleading. A more satisfactory method is to determine the possible presence of a clustering tendency, or a constant known as the dispersion, or the standard deviation around the mean value. If, for illustration, it is found that the mean stature of Norwegian conscripts is 67.5 inches and the dispersion is 2.33 inches, this means that about 68 per cent. of the Norwegian conscripts measure between 65.17 and 69.83 inches.* More precise statistical analysis readily disproves the common error that all statistical frequency curves are true symmetrical curves. This point of view was first advanced by the German mathematician Gauss, and unfortunately widely accepted among statisticians of modern times. As a matter of fact, however, the symmetrical distribution is the exception rather than the rule, and the correct ascertainment of frequency distribution requires in addition to the mean and the dispersion the computation of at least two additional parameters, the skewness and the excess. As explained by Mr. Arne Fisher, "These two statistical characteristics are purely abstract numbers." A positive skewness indicates a tendency to a heavier clustering of values greater than the mean; negative skewness indicates a heavier clustering of values less than the mean. A positive

* The importance of the dispersion (also called the standard deviation) as the best measure of a clustering tendency about the mean value of a variate is emphasized in the formulas of the mathematical theory of probability. Through a simple application of the Bernoullian theorem, or the so-called "law of large numbers," it can be shown that a range of six times the dispersion will include more than 99 per cent. of the bulk of the observations, while two ordinates drawn both to the right and to the left of the mean at a distance from the mean equal to the dispersion will include about 68 per cent. of the area of the frequency curve.

excess means a tendency to make the frequency curve topheavy around the mean; a negative excess indicates a flattening tendency. Once having computed the various statistical parameters represented by the mean, the dispersion, the skewness and the excess, the frequency distribution is easily ascertained for any value of the varying attributes and reduced to a common standard of measure. This method has been followed and is sufficiently explained in the diagrams of frequency distribution of the conscripts of Norway, Sweden, Denmark, Württemberg and Japan, and the corresponding measurements of recruits of the United States Army previously to the present war. (See diagram on page 32.) All of the frequency dispersions have been reduced to English measure. The values of the various statistical parameters are as follows: *

STATISTICAL AND MATHEMATICAL CONSIDERATIONS OF FREQUENCY DISTRIBUTION IN PHYSICAL PROPORTIONS

COMPARATIVE MEASUREMENTS

Values of the Various Statistical Parameters

Country	Mean	Dispersion	Skewness	Excess	Coefficient of Variability
U. S. A. (1906–15)	67.52″	2.198″	–0.0570	–0.0062	3.255
Sweden (1914)	67.66″	2.535″	0.0008	0.0084	3.747
Norway (1913)	67.49″	2.335″	–0.0106	–0.0163	3.460
Denmark (1916)	66.54″	2.573″	0.0062	0.0147	3.867
Württemburg (1911)	65.63″	2.313″	0.0293	–0.0064	3.524
Japan (1915)	62.30″	2.262″	0.0124	–0.0091	3.631

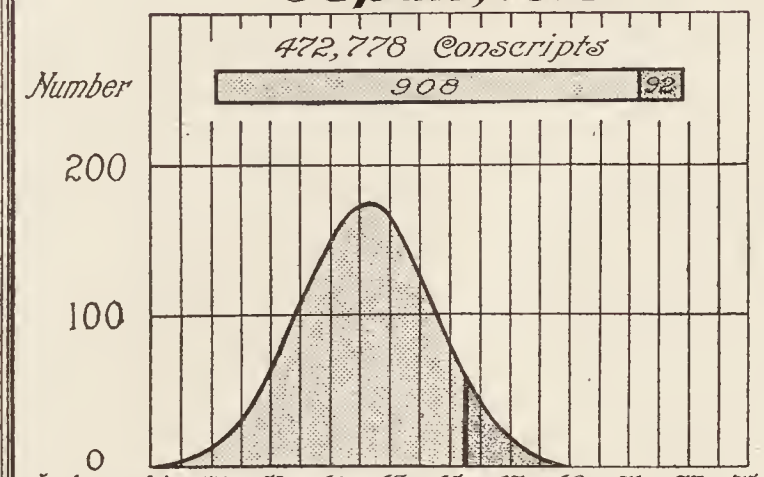
According to this table the variation is most pronounced in the case of the Danes. The Swedes are evidently the tallest of the races included in the comparison, showing both a positive skewness and a positive excess. Computing the distribution from the equations of the frequency curves, Mr. Fisher presents the following comparative results on the basis of 1,000 standard measurements progressing by one-inch intervals for the six countries for which the data could be secured.

* For an elementary description of frequency distributions see "Elderton's 'Primer of Statistics'" (London, 1910), and H. Secrist's "Introduction to Statistical Methods" (New York, 1917). A more advanced treatment is to be found in Udny Yule's "Theory of Statistics" (London, 1911). Of special value are the observations by Secrist on the Graphic Presentation of Simple Frequency Series. He properly directs attention to the common error of "Taking measurements with extreme accuracy and then grouping them into broad classes." And he suggests that "Measurements should be so grouped as to show the variability and at the same time to leave the frequency distribution fairly smooth." "For," he remarks in continuation, "in the matter of grouping there are two opposing tendencies —grouping into too few classes to show variability and grouping into too many classes to give a smooth distribution." In many cases "the law of distribution is hidden because of too much detail."

Comparative Stature of Conscripts and Recruits

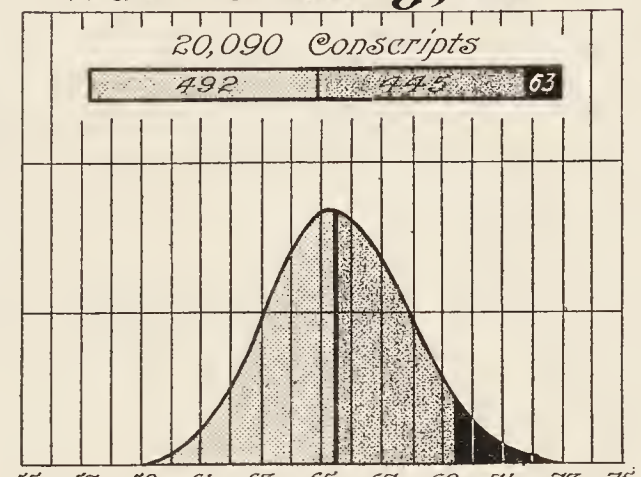
Number of Conscripts or Recruits at Various Heights (in inches) per 1000

Japan, 1915



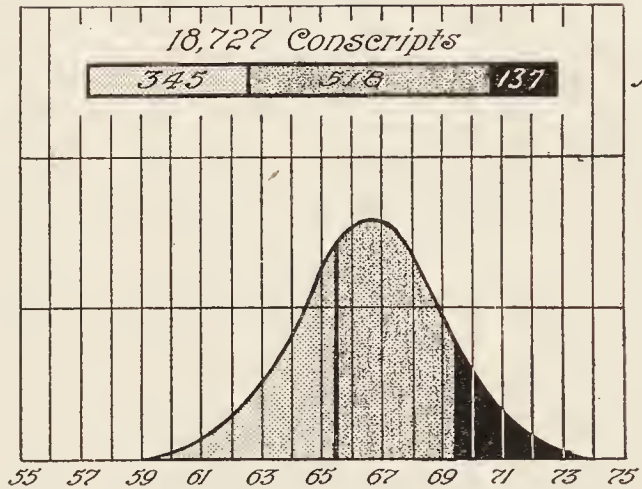
Mean Stature, 62.3 In. Skewness, +0.012
Dispersion, 2.26 In. Excess, —0.009

Würtremberg, 1911



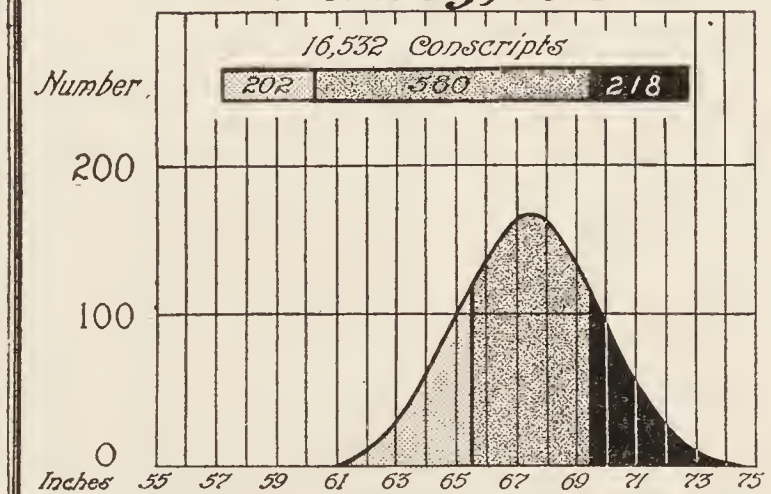
Mean Stature, 65.6 In. Skewness, —0.029
Dispersion, 2.31 In. Excess, —0.006

Denmark, 1916



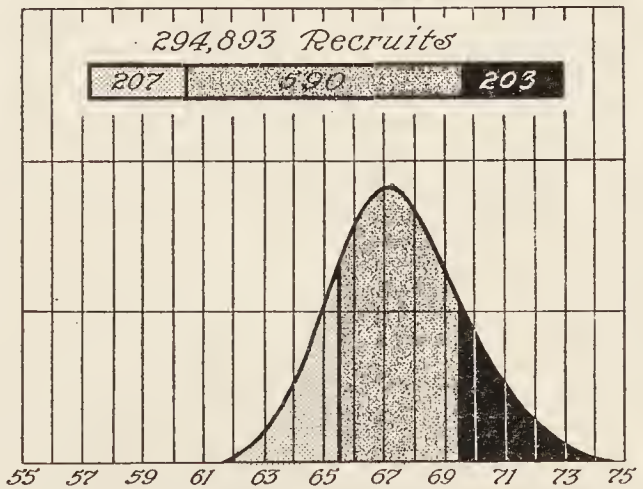
Mean Stature, 66.5 In. Skewness, +0.006
Dispersion, 2.57 In. Excess, +0.015

Norway, 1913



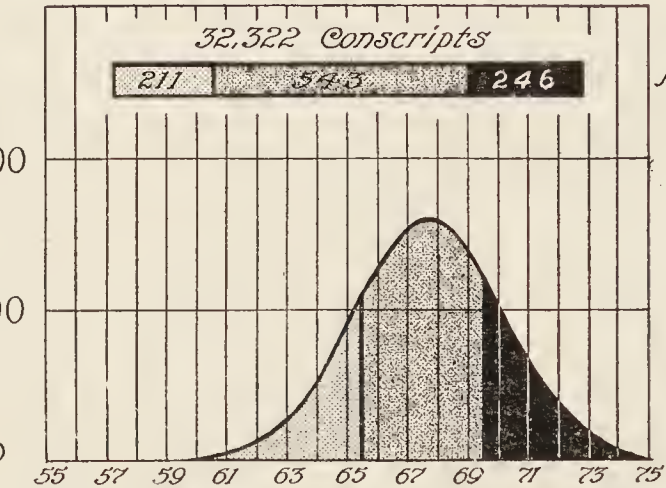
Mean Stature, 67.5 In. Skewness, —0.011
Dispersion, 2.34 In. Excess, —0.016

United States, 1906-1915



Mean Stature, 67.5 In. Skewness, —0.057
Dispersion, 2.20 In. Excess, —0.006

Sweden, 1914



Mean Stature, 67.7 In. Skewness, +0.001
Dispersion, 2.54 In. Excess, +0.008

Short Stature | Medium Stature | Tall Stature

Statistician's Dept., The Prudential Insurance Company of America

STATURE OF ARMY CONSCRIPTS AND RECRUITS IN INCHES, AS DETERMINED BY LAPLACEAN-CHARLIER FREQUENCY CURVES

(By Arne Fisher)

Inches	U. S. Army Recruits 1906-1915	Norwegian Conscripts 1913	Swedish Conscripts 1914	Danish Conscripts 1916	Württemberg Conscripts 1911	Japanese Conscripts 1915
56	.....	.....	.....	.....	.....	4.7
57	.....	.....	.....	.....	.....	12.5
58	.....	.....	.....	.....	.....	31.6
59	.....	.....	1.3	2.9	1.2	64.0
60	.....	.....	2.2	6.7	7.0	106.5
61	.....	2.1	5.4	15.0	22.7	148.6
62	3.8	9.9	12.9	30.2	53.4	173.0
63	19.2	29.4	27.5	54.0	96.9	169.8
64	53.8	60.1	53.4	92.6	141.7	132.8
65	105.5	100.3	88.6	130.5	167.5	83.9
66	155.7	137.6	127.8	157.7	164.8	44.2
67	182.2	165.2	155.3	160.0	137.2	20.8
68	169.5	163.1	159.7	136.0	97.0	6.4
69	129.4	132.8	138.5	96.9	59.2	1.2
70	86.8	96.4	102.0	59.4	30.9	.....
71	51.0	58.9	63.4	31.7	13.6	.....
72	26.3	28.7	34.6	15.2	5.0	.....
73	11.4	11.3	16.4	6.7	1.5	.....
74	4.2	3.2	7.0	2.8	0.3	.....
75	1.2	0.5	2.7	1.1	.....	.....
76	.....	0.3	1.3	0.4	.....	.....
77	.....	0.2	.....	0.2	.....	.....

This table clearly emphasizes the error which underlies the non-critical use of the general average and the importance of utilizing the frequency distribution as a more trustworthy measure of physical types. In the two diagrams three shades have been adopted, relatively for short, medium and tall stature. The contrast, for illustration, between the complete absence of persons of tall stature from the Japanese army and the preponderance of tall men in the Swedish army is very striking. The diagrams strongly suggest the urgency of more qualified attention to questions of physical anthropology and the necessity of the ascertainment of new standards which if available would meet many pressing army, medical and other practical requirements.

STANDARD METHODS OF ANTHROPOMETRIC MEASUREMENTS

The value of the anthropometric statistics of the United States recruits or enlistments previously to the war is probably more limited than the scientific use of the corresponding data for European conscripts, since no particular value was attached to the importance of accuracy in such measurement. There are convincing reasons for believing that in a sufficient proportion both the height and the weight were rather guessed at than ascertained with the required precision.

This element of inherent inaccuracy also underlies the new measurements of the men of the National Army, and the results though truly colossal in their proportions will be decidedly less in scientific value than would easily have been the case, if the necessity for accuracy in measurement and the urgency of a preliminary training for such measurements had been recognized by the army authorities. For the data, aside from their military use, as observed by the Committee on Anthropology of the National Research Council, could and no doubt would be utilized for broader scientific purposes. It was therefore considered imperative that the following directions regarding such measurements should be followed to the letter. Unfortunately, these recommendations were not adopted.

SUGGESTED DIRECTIONS FOR ANTHROPOMETRIC MEASUREMENTS AT RECRUITING STATIONS.

(Committee on Anthropology, National Research Council.)

Instruments.

A. Tape 4 feet long, 1¾ inches wide, for measuring height;

B. A wooden square, an adjunct to *A*;

C. Tape 3 feet long, ⅝ inches wide, for measuring chest.*

Preparation.

(1) Select the best lighted part of the available wall space. If a choice is possible, select the side in which the light will strike the recruit from the left side.

(2) Measure with tape *A* exactly three feet from the floor, and make a horizontal line at that point.

(3) Fasten tape *A* with a couple of suitable tacks or nails, vertically on the wall, in such a way that its lower edge coincides with the three-foot mark. The top of the tape will now be 7 feet from the ground.

Directions for Measurements.

1. Height—Stand recruit, in bare feet and without coat against the tape on the wall.

   See to it that he stands straight, but without straining or stretching, touching the wall with his heels, buttocks and shoulders, and holding his head so that he looks straight forward. The head may touch the tape on the wall, but does not need to do so.

   Apply wooden square horizontally to tape on the wall and bring it down on the head of the subject, with sufficient pressure

* There is a probable inconsistency in the recommendation for a three-foot tape-measure for chest measurements. It would probably be best to furnish the examiner with a standard tape-measure of not less than forty-eight inches; while for height measurements a measure of seventy-two inches would probably be preferable to one of forty-eight inches, placed thirty-six inches above the ground.

to feel the hard calvarium, and carefully note measurement, to the nearest 1/8 of an inch.

2. Circumference of Chest—The recruit faces the light as well as the examiner.

The elbows are raised somewhat (about 45 degrees from the body). Facing the recruit the examiner passes the tape behind the body. One end held in the left hand is pressed against the middle of the chest on a level with the nipples while the other end is brought around by the right hand until the overlapping permits of correct reading.

Record measurement in utmost expiration and deepest inspiration.

Sources of error to be strictly avoided: Conversation during measuring; interruptions; incorrect reading of scale; incorrect recording.

(The suggested measurements would not require any very considerable degree of scientific skill and as regards cost it was estimated that the total amount would be less than $1 for each set of instruments as required for each recruiting station.)

STATURE OF ACCEPTED UNITED STATES RECRUITS UNDER THE VOLUNTARY SYSTEM OF ENLISTMENT

As a practical illustration of the truly immense opportunity for the scientific ascertainment of the varying bodily proportions among men of military age, the following table shows the observed number of recruits at various ages in the experience of the United States Army during the period 1906-15.*

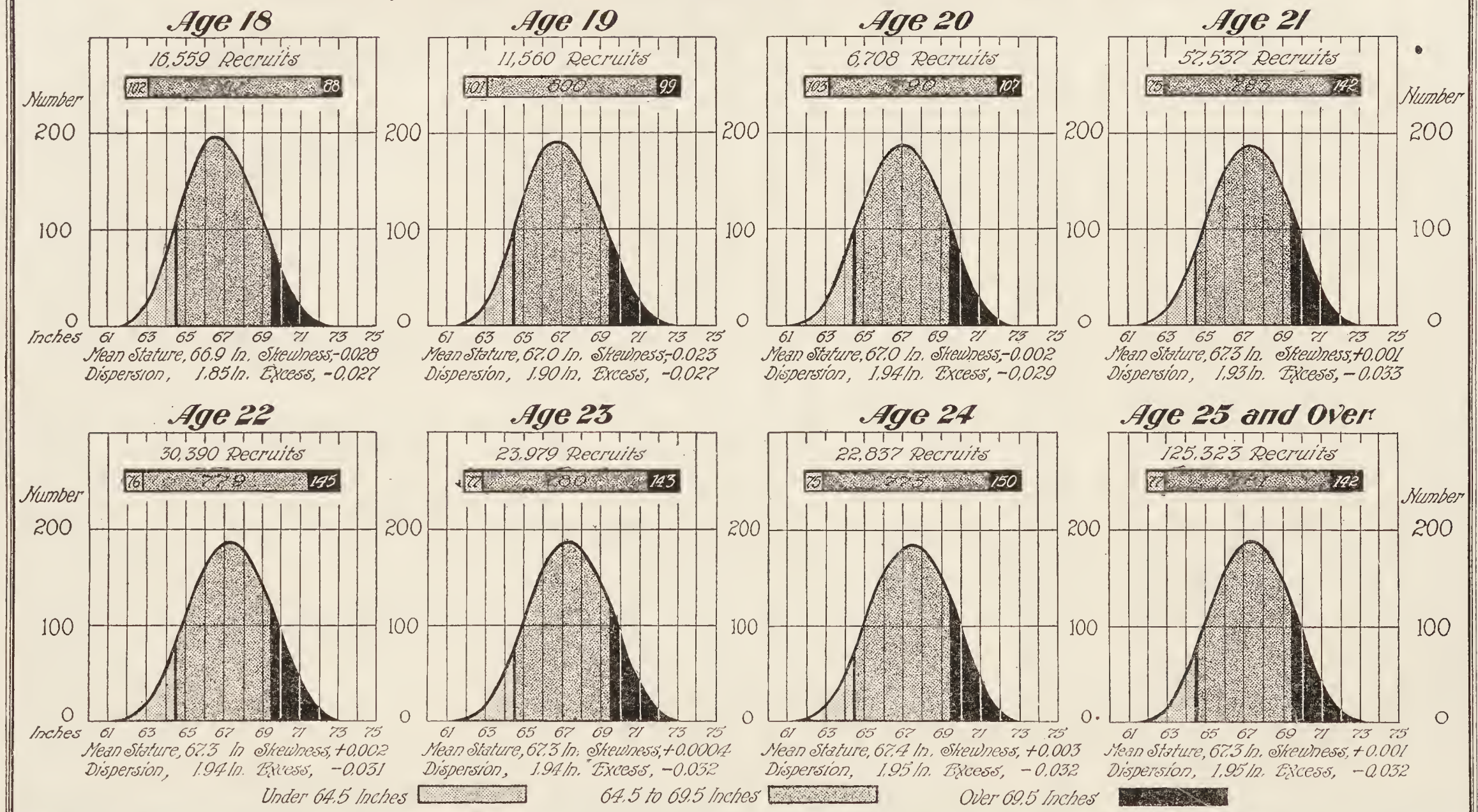
OBSERVED NUMBER OF RECRUITS AT VARIOUS AGES
UNITED STATES ARMY, 1906–1915

Inches	18	19	20	21	22	23	24	25 and Over
62	.....	.....	.....	.....	.....	.....	.....	.....
63	219	189	118	617	345	211	228	1305
64	1453	986	574	3910	2079	1713	1546	8534
65	2487	1626	924	6453	3390	2771	2572	14404
66	3087	2109	1125	9013	4755	3767	3554	20162
67	3112	2171	1281	10621	5472	4176	3997	22416
68	2773	1918	1103	10298	5461	4361	4095	22162
69	1887	1328	796	8165	4255	3356	3291	17473
70	1064	833	517	5409	2991	2375	2259	12197
71	477	400	270	3051	1642	1249	1295	6670
Total	16559	11560	6708	57537	30390	23979	22837	125323

* In this computation all the statures below 63 inches and all those above 71 inches have been omitted. The nine-inch interval was chosen because of the fact that a very few tall and a very few short recruits would tend to displace any indications of change in stature among the greater bulk of younger members. The computed frequency curves must therefore not be confused with data on page 39 showing the whole range of variation or with the frequency curve for recruits of all ages.

Stature of United States Recruits—1906-1915

Number of Recruits at Various Heights (in inches) per 1,000 of Each Age



Statistician's Dept., The Prudential Insurance Company of America

This table represents the measurement of 294,893 recruits. Unfortunately and in obvious disregard of scientific requirements the results for the measurements for ages 25 and over are given as a group. The average for such a group including all ages up to the military limit must necessarily be misleading and utterly inconclusive, since this group includes 125,323 measurements, or 42.5 per cent. of the total measurements, at all ages. The scientific error of returning the results for ages 25 and over in the aggregate is of sufficient magnitude to seriously impair the value of the returns as a whole. For the purpose of ascertaining the frequency distribution of stature in relation to age, the returns should have been given by single years of life, certainly up to age 40; and if this had been done, the results would have been much more valuable in their application to practical uses than as published annually in their present form in the Surgeon General's report.

Fitting the above data to frequency curves, Mr. Fisher has obtained for me the following values for the various statistical parameters:

FREQUENCY DISTRIBUTION OF STATURE, UNITED STATES ARMY RECRUITS
1906-1916

Statistical Parameters

Age	Mean	Dispersion	Skewness	Excess
18	66.900 inches	1.855 inches	–0.0283	–0.0269
19	66.965 "	1.898 "	–0.0235	–0.0275
20	67.024 "	1.936 "	–0.0018	–0.0290
21	67.329 "	1.929 "	0.0009	–0.0303
22	67.341 "	1.943 "	0.0024	–0.0310
23	67.329 "	1.939 "	0.0004	–0.0325
24	67.367 "	1.948 "	0.0027	–0.0321
25 and over	67.325 "	1.948 "	0.0011	–0.0317

The theoretical frequency distribution per 1,000 recruits at single years of life under age 25 and at ages 25 and over, considered as a group, is as follows:

FREQUENCY DISTRIBUTION OF STATURE, UNITED STATES ARMY RECRUITS
1906–1915
(Based on the heights between 63 and 71 inches)

Inches	18	19	20	21	22	23	24	25 and Over
62	2.9	3.5	5.2	2.4	2.7	2.4	2.5	2.4
63	24.2	24.7	26.4	17.9	18.4	18.3	17.9	18.1
64	74.7	73.3	71.1	54.6	55.3	55.9	54.6	56.5
65	142.9	135.7	127.2	109.7	109.3	111.5	108.1	111.3
66	188.8	182.7	172.5	160.7	158.9	159.8	157.6	160.9
67	195.7	192.2	187.7	186.0	183.8	183.7	182.4	184.6
68	166.9	167.8	172.8	181.0	179.9	178.9	179.6	179.1
69	116.1	121.2	129.4	145.9	147.0	146.0	147.7	145.0
70	61.0	66.7	72.9	91.4	92.2	91.6	94.7	90.6
71	22.0	25.6	28.6	39.7	41.1	40.7	42.8	40.3
72	4.7	6.2	6.1	10.3	10.7	10.6	11.4	10.5
73	0.1	0.4	0.1	0.4	0.7	0.6	0.7	0.6

RACE IN RELATION TO FREQUENCY DISTRIBUTION OF STATURE

Apparently the intensity of the variation in stature increases with the age as indicated by the dispersion or standard deviation. The skewness remains negative up to age 21, but from that age onward it is positive. According to Mr. Arne Fisher, "The figures seem to indicate that bodily growth in respect to height to all practical purposes is completed between the ages of 20 and 21, and that from this period onward the statistical parameters remain practically constant." This conclusion, however, might be modified if the details for single years of life subsequent to age 24 were available. The anthropometric values for adult ages are of a much higher degree of practical utility than has thus far been recognized. The most notable contribution to the study of this important aspect of physical anthropology is the results obtained by the Medico-Actuarial Committee from the experience of American life insurance companies. The scientific value of these results, however, is materially impaired by the fact that the measurements represent a heterogeneous group, just as this was the case with American recruits previously to the present war. Indifference to the factor of race or racial inheritance of bodily physical proportions impairs aggregate data representative of widely varying types of mankind. Comparing the frequency distribution of the heights of American males as ascertained by the Medico-Actuarial investigation with the heights of United States Army recruits, it becomes apparent that either the measurements were wanting in accuracy, or, as is more likely, that the results represent a compound curve consisting on the one hand of males above average stature typical of the native United States population, Scotchmen, Scandinavians, etc., and males of short stature typical of Southern European races. A compound frequency curve for such heterogeneous elements cannot possibly be relied upon as trustworthy for scientific and a variety of practical purposes unless the relative racial distribution is known with at least approximate accuracy. A critical examination of the corresponding curve for Italian recruits exhibits a somewhat similar phenomenon. Obviously the inclusion of the short-type recruits from the southern provinces with the relatively tall-type recruits from the northern part of Italy in one curve yields results practically applicable to neither group but representative of a non-existing type, which, of course, is scientifically misleading.

In the United States Army the racial aspects of army recruiting have been limited to the whites and the negroes, or persons of African descent, the Indians and the Filipinos. The essential statistical facts of the recruiting physique of the whites and of the negroes are presented in the following series of tables:

DISTRIBUTION OF STATURE ACCORDING TO AGE OF ACCEPTED UNITED STATES RECRUITS (WHITE), 1906–1915, PER 1000

Height	18 Years and Under	19	20	21	22	23	24	25	26 and Over	All Ages
Under 63 inches	1	1	1	1	1	1	1	1	2	1
63 inches	13	16	17	10	11	10	9	11	10	10
64 "	86	83	83	65	65	69	64	63	64	67
65 "	147	137	133	108	106	109	107	107	109	112
66 "	182	177	162	150	149	152	147	149	152	154
67 "	184	182	184	177	172	166	165	167	169	172
68 "	164	161	159	171	171	170	169	168	167	168
69 "	111	111	114	136	134	130	136	130	132	131
70 "	63	70	74	90	94	95	94	96	91	89
71 "	28	34	39	51	52	51	54	54	50	49
72 " and over	21	28	34	41	45	47	54	54	54	47
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
No. of men	16931	11910	6953	60104	31872	19477	24171	18544	114151	304113

This table may be compared with the table below for colored recruits or persons of African descent:

DISTRIBUTION OF STATURE ACCORDING TO AGE OF ACCEPTED UNITED STATES RECRUITS (COLORED), 1906–1915, PER 1000

Height	18 Years and Under	19	20	21	22	23	24	25	26 and Over	All Ages
Under 63 inches	5	.....	.....	1	2	.....	1	.....	2	1
63 inches	17	17	15	7	8	10	8	6	9	9
64 "	112	108	89	72	51	66	64	65	58	65
65 "	165	137	131	133	127	116	125	128	113	121
66 "	195	172	193	164	174	155	154	168	158	163
67 "	189	189	159	164	181	181	161	171	183	179
68 "	124	149	162	173	164	162	179	179	169	168
69 "	107	104	104	133	122	144	133	121	125	126
70 "	59	70	70	80	85	79	82	80	87	82
71 "	19	29	34	43	47	45	42	37	50	45
72 " and over	8	25	43	30	39	42	51	45	46	41
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
No. of men	597	518	327	2334	1608	1166	1344	1052	9056	18002

The much lesser number of colored recruits precludes a strict comparison, but in the main the data may be relied on as trustworthy. As will be observed, the total number of white recruits examined was 304,113, against 18,002 colored.

RACE IN RELATION TO WEIGHT

The distribution of white recruits by weight is presented in the table below. Possibly the grouping of the weights in series of ten pounds each falls short of the required degree of scientific attainment, and five-pound groups would perhaps have been preferable:

DISTRIBUTION OF WEIGHT ACCORDING TO AGE OF ACCEPTED UNITED STATES RECRUITS (WHITE)
1906–1915, PER 1000

Weight	18 Years and Under	19	20	21	22	23	24	25	26 and Over	All Ages
Under 120 lbs.	41	33	26	15	12	12	12	12	16	17
120–129 lbs.	348	308	270	189	160	141	127	128	106	156
130–139	325	335	317	304	281	270	251	248	213	261
140–149	187	204	217	265	276	278	273	272	238	250
150–159	69	80	115	144	164	177	185	184	181	161
160–169	21	28	37	57	72	78	94	93	113	83
170–179	6	8	13	18	25	30	37	39	63	38
180 and over	3	4	5	8	10	14	21	24	70	34
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
No. of men	16931	11910	6953	60104	31872	19477	24171	18544	114151	304133

The corresponding distribution of weight according to age of accepted colored recruits is presented in the table below:

DISTRIBUTION OF WEIGHT ACCORDING TO AGE OF ACCEPTED UNITED STATES RECRUITS (COLORED)
1906–1915, PER 1000

Weight	18 Years and Under	19	20	21	22	23	24	25	26	All Ages
Under 120 lbs.	27	31	21	12	3	4	7	4	4	7
120–129	286	257	172	124	119	101	71	80	63	95
130–139	342	303	339	290	243	220	211	213	177	217
140–149	234	234	248	286	289	281	292	270	242	259
150–159	79	117	122	178	201	208	220	246	209	199
160–169	25	37	67	69	102	117	124	116	150	120
170–179	5	15	25	30	29	45	54	44	77	56
180 and over	2	6	6	11	14	24	21	27	78	47
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
No. of men	597	518	327	2334	1608	1166	1344	1052	9056	18002

Mr. Arne Fisher has also worked out for me the frequency curves for weight according to age for white recruits. In the analysis of these curves he points out that on account of the military requirements as to the minimum permissible weight of recruits there exists a well-defined lower limit for the range of the curve of a more pronounced character than in the case of the measurements of stature. On this account the curves are rather skew in appearance and therefore represented by the type known as the Poisson-Charlier B Curves. The theoretical frequency distribution by five-pound groups per 1,000 recruits at single years of life under age 25 and at ages 25 and over, considered as a group, is as follows:

FREQUENCY DISTRIBUTION OF WEIGHT—UNITED STATES ARMY RECRUITS AS DETERMINED FROM POISSON-CHARLIER FREQUENCY CURVES

Pounds	18	19	20	21	22	23	24	25 and Over
Under 120	54.4	43.8	33.7	16.6	11.7	7.8	9.9	6.7
120–124	141.9	123.6	102.1	63.0	51.2	35.7	43.1	32.3
125–129	188.0	176.4	158.7	120.0	100.8	82.8	91.9	75.8
130–134	177.0	176.5	170.0	156.0	142.3	130.2	130.3	115.7
135–139	147.9	147.9	149.0	159.6	156.4	157.5	141.3	131.3
140–144	108.4	115.2	120.4	141.1	141.1	158.6	130.2	121.7
145–149	78.4	85.4	94.1	113.9	122.8	136.7	111.8	102.6
150–154	51.8	58.8	69.7	85.9	95.5	106.9	94.3	87.5
155–159	30.4	36.3	47.1	60.3	69.6	75.9	78.1	78.4
160–164	15.7	19.9	28.5	38.8	46.6	48.4	61.2	70.4
165–169	7.1	9.6	15.3	22.8	28.7	29.2	44.4	59.5
170–174	2.9	4.2	7.3	12.1	16.3	16.0	29.1	45.6
175–179	1.1	1.6	3.2	5.9	8.2	8.1	17.2	31.5
180–184	0.3	0.6	1.2	2.6	3.0	3.8	9.3	19.6
185–189	0.0	0.0	0.4	1.1	1.7	1.7	4.6	11.0
190–194	0.0	0.0	0.2	0.4	0.8	0.7	2.1	5.7
195–199	.....	.....	0.1	0.2	0.3	0.1	1.2	2.7
200–204	.....	.....	.....	.....	.....	.....	.....	1.2
205–209	.....	.....	.....	.....	.....	.....	.....	0.5
210–214	.....	.....	.....	.....	.....	.....	.....	0.2

The frequency curves are shown in graphic form on page 42.

RACE IN RELATION TO CHEST MEASUREMENTS

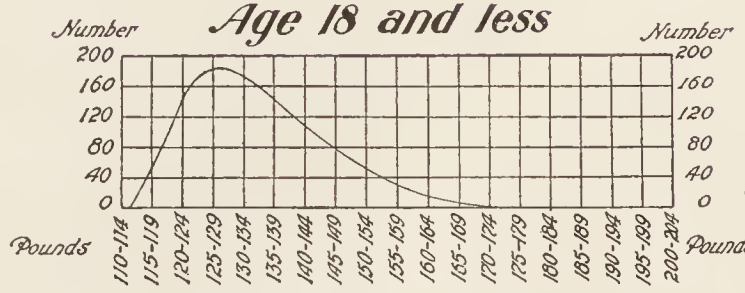
The third and last physical measurement of United States Army recruits, as reported upon by the Surgeon General is the chest measurement. Unless the method of measurement employed is carefully defined and its precise significance is clearly indicated, the results may be quite considerably at variance with the facts or the inferences drawn therefrom. Methods of chest measurement vary widely. * The difference between the chest at rest and the maximum expansion and the minimum deflation is not only quite considerable but not always accurately ascertained without difficulty. What the methods have been in the Army, how much they have varied from time to time and whether the instructions have been precisely followed are all matters open to question. The distribution of chest measurements as obtained for white recruits is given in the table following:

* The rules regarding chest expansion have undergone more or less important changes. According to the new standard of physical examination promulgated by the Secretary of War under date of June 5, 1918, all registrants "with a chest measurement of less than thirty inches and a chest mobility of less than two inches" require to be unconditionally rejected. The Army rules require "all chest measurements to be taken on a level just above the nipple." See "Details of Military Medical Administration," by Joseph H. Gord, Colonel, Medical Corps, United States Army, Philadelphia, 1918, page 493. The chest expansion must not, of course, be confused with pulmonary capacity. B. A. Gould, in his Investigations in the Military and Anthropological Statistics of American Soldiers, considered this question at considerable length, including observations on the relation of pulmonary capacity to stature, to length of body, to circumference of chest, to play of chest, and to age. He refers to the well-known observations by Hutchinson, according to whom "The vital capacity differs in man according to height, weight, age and disease." For these and other reasons, all chest measurements should be in conformity to thoroughly standardized and well-understood methods. of examination. See, also, Direction No. 2 on page 35.

Weight of United States Recruits—1906-1915

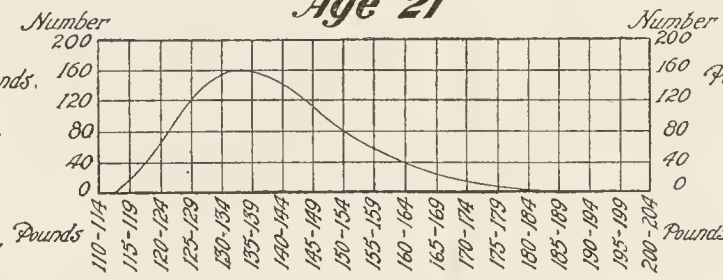
Number of Recruits at Various Weights (in pounds) per 1000 of Each Age

Age 18 and less



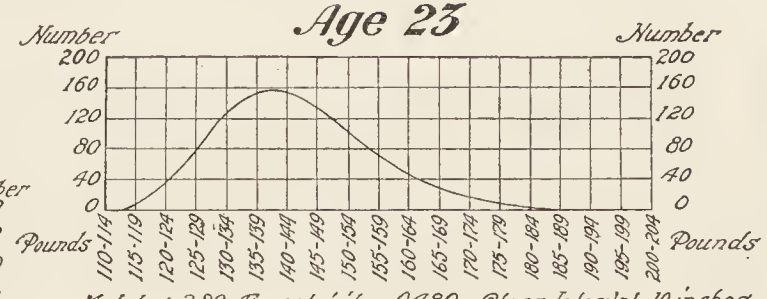
Modulus 2.00 Excentricity -0.332 Class Interval 10 inches

Age 21



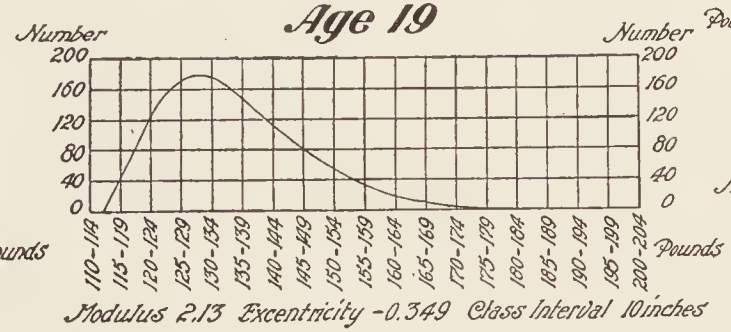
Modulus 2.62 Excentricity -0.453 Class Interval 10 inches

Age 23



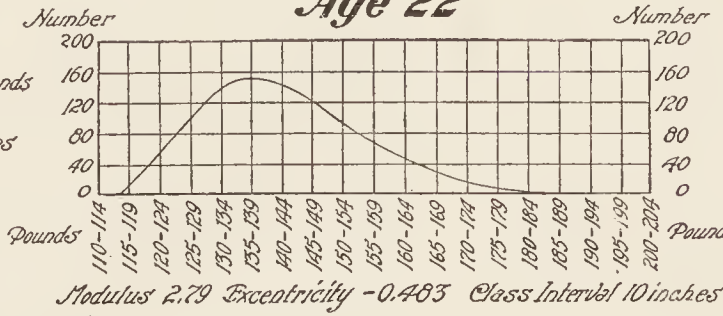
Modulus 2.89 Excentricity -0.489 Class Interval 10 inches

Age 19



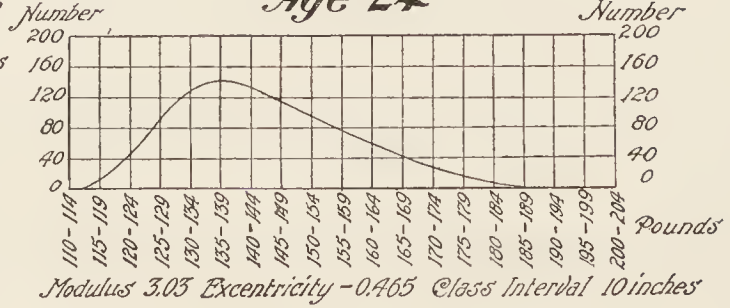
Modulus 2.13 Excentricity -0.349 Class Interval 10 inches

Age 22



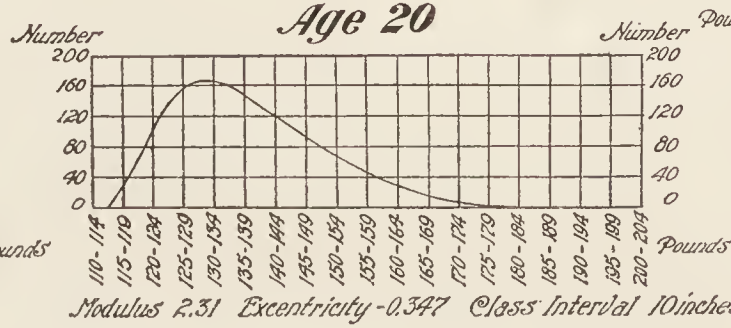
Modulus 2.79 Excentricity -0.483 Class Interval 10 inches

Age 24



Modulus 3.03 Excentricity -0.465 Class Interval 10 inches

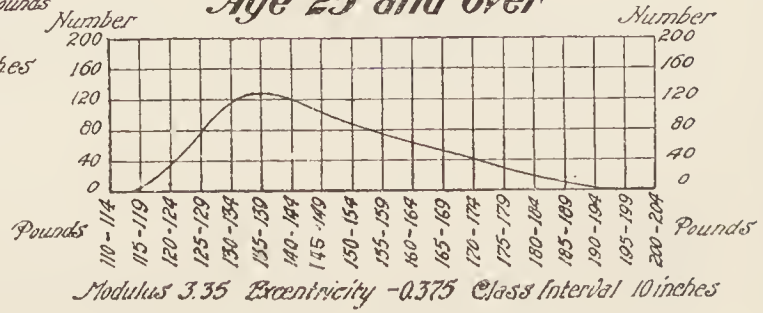
Age 20



Modulus 2.31 Excentricity -0.347 Class Interval 10 inches

Note:—Frequency Distribution per 1000 Graduated by means of Poisson-Charlier Frequency Curves

Age 25 and over



Modulus 3.35 Excentricity -0.375 Class Interval 10 inches

DISTRIBUTION OF CHEST MEASUREMENTS ACCORDING TO AGE OF ACCEPTED UNITED STATES ARMY RECRUITS (WHITE) 1906–1915, PER 1000

Chest Measurement	18 Years and Under	19	20	21	22	23	24	25	26	All Ages
Under 31	139	110	91	53	41	33	28	28	20	42
31	201	188	169	118	103	89	79	74	58	95
32	296	287	257	246	222	203	181	179	141	197
33	198	213	229	242	241	237	235	233	190	217
34	107	121	142	177	194	208	206	207	196	185
35	40	53	67	98	115	125	143	142	153	123
36	15	21	32	45	54	66	77	81	107	72
37	3	5	9	15	19	25	31	34	60	34
38	1	1	2	4	8	10	13	14	36	18
39 and over	0.4	1	2	2	3	4	7	8	39	17
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
No. of men	16931	11910	6953	60104	31872	19477	24171	18544	114151	304113

The frequency distributions according to chest measurement for white recruits as determined by Mr. Fisher from the Poisson-Charlier frequency curves give the following values according to age:

FREQUENCY DISTRIBUTION OF CHEST MEASUREMENTS—UNITED STATES ARMY RECRUITS AS DETERMINED FROM POISSON-CHARLIER FREQUENCY CURVES

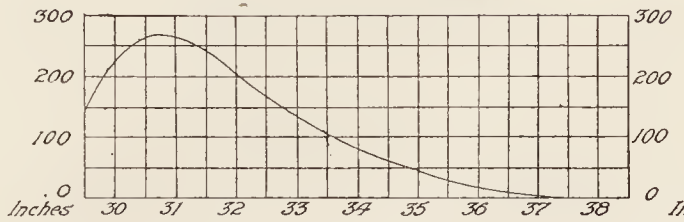
Inches	18 Years and Under	19	20	21	22	23	24	25	26 and Over
Under 31	225.8	93.5	75.9	41.5	32.7	26.0	21.4	20.9	16.2
32	281.4	225.4	197.1	143.5	122.4	105.3	91.4	88.8	66.3
33	202.9	267.7	254.5	232.6	213.9	197.7	181.3	176.9	135.9
34	131.1	208.9	217.9	239.2	237.4	234.5	227.5	224.2	186.5
35	82.2	120.6	139.1	176.7	189.5	199.2	205.0	204.9	192.9
36	45.2	54.8	70.6	100.0	116.0	129.8	142.0	144.5	160.4
37	20.6	20.5	29.8	44.8	56.6	67.3	78.6	81.7	111.6
38	7.8	6.4	10.7	16.1	22.3	28.2	35.4	37.9	67.0
39	2.4	1.7	3.4	4.6	7.0	9.4	13.0	14.5	35.2
40	0.7	0.4	0.9	0.9	1.8	2.5	3.8	4.5	16.6
41	0.1	0.1	0.3	0.1	0.2	0.3	0.7	1.1	7.1
42	.....	.....	0.1	0.1	0.1	0.1	0.1	0.2	2.7
43	.....	.....	.....	.....	.....	.....	.....	.....	1.0
44	.....	.....	.....	.....	.....	.....	.....	.....	0.4
45	.....	.....	.....	.....	.....	.....	.....	.....	0.2

The frequency curves are shown in graphic form on page 44.

Chest Measures of United States Recruits—1906-1915

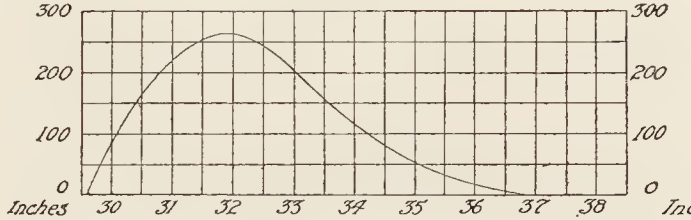
Number of Recruits at Various Measures (in inches) per 1000 of Each Age

Age 18 and less



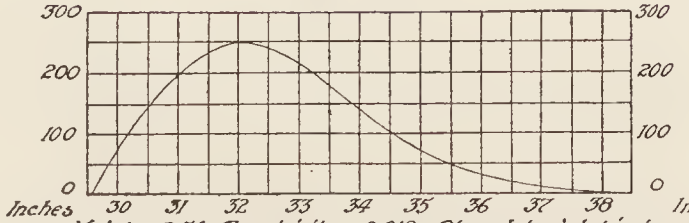
Modulus 1.84 Excentricity +0.420 Class Interval 1 inch

Age 19



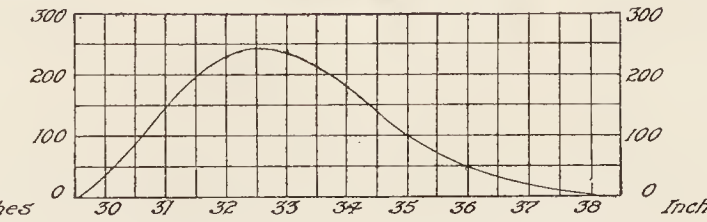
Modulus 2.33 Excentricity -0.044 Class Interval 1 inch

Age 20



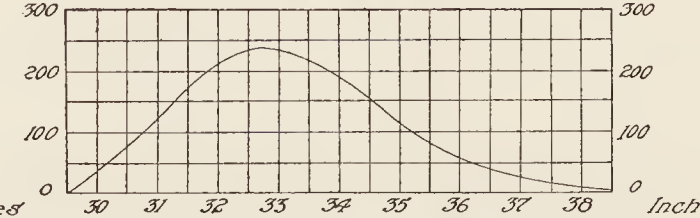
Modulus 2.56 Excentricity -0.019 Class Interval 1 inch

Age 21



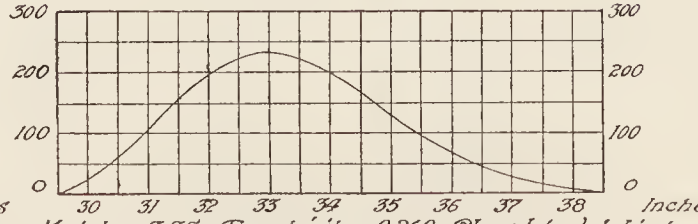
Modulus 2.96 Excentricity -0.200 Class Interval 1 inch

Age 22



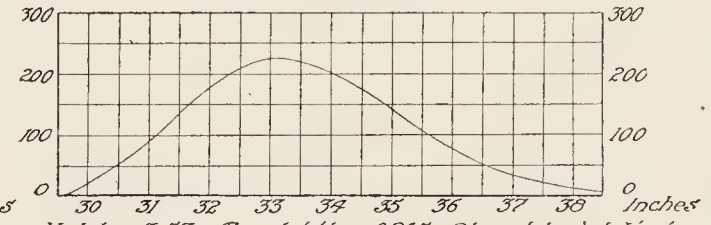
Modulus 3.17 Excentricity -0.221 Class Interval 1 inch

Age 23



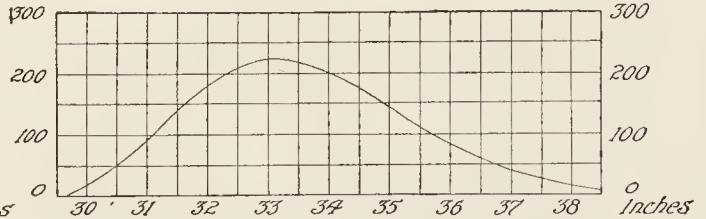
Modulus 3.35 Excentricity -0.260 Class Interval 1 inch

Age 24



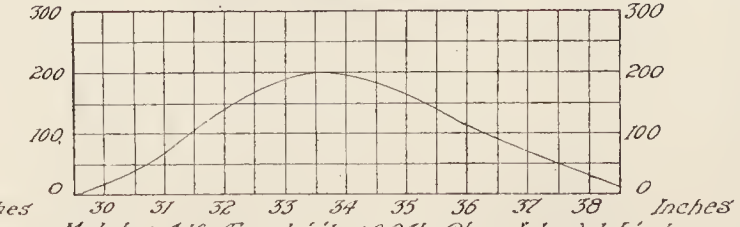
Modulus 3.53 Excentricity -0.265 Class Interval 1 inch

Age 25



Modulus 3.58 Excentricity -0.248 Class Interval 1 inch

Age 26 and over



Modulus 4.16 Excentricity +0.041 Class Interval 1 inch

Note: Frequency Distribution per 1000 Graduated by means of Poisson-Charlier Frequency Curves

The chest measurements of the colored are as follows:

DISTRIBUTION OF CHEST MEASUREMENTS ACCORDING TO AGE OF ACCEPTED UNITED STATES RECRUITS (COLORED)
1906-1915, PER 1000

Chest Measurement	18 Years and Under	19	20	21	22	23	24	25	26 and Over	All Ages
Under 31	178	137	98	72	51	32	31	27	17	40
31	203	210	162	127	123	72	65	80	55	86
32	291	303	260	241	216	213	200	190	140	185
33	196	180	220	224	229	235	240	237	187	206
34	80	95	131	180	204	194	213	210	206	194
35	37	48	80	83	113	135	132	134	162	132
36	10	21	31	50	44	71	83	76	111	82
37	3	4	9	15	14	35	22	26	60	39
38	.....	2	9	5	4	10	8	14	33	20
39 and over	2	.....	.....	3	2	3	6	6	29	16
Total	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
No. of men	597	518	327	2334	1608	1166	1344	1052	9056	18002

Whether these statistics are really useful and conclusive for scientific purposes is an open question. How far the results are in consequence of methods of selection cannot, of course, be decided until the data have been subjected to extended analysis. It is shown, for illustration, that of the white recruits the proportion with a chest measurement of less than 33 inches was 33.4 per cent., in comparison with 31.1 per cent. for the colored. General investigations into the comparative anthropometry of white and colored races, especially Americans of African descent, disclose more pronounced differences in their vital capacity than are here indicated. An admirable illustration of such comparative studies in physical anthropology is the report by Dr. Ales Hrdlicka on One Thousand White and Colored Children, Inmates of the New York Juvenile Asylum. It may also be said that the chest measurements in the Army are required to be taken on a level, just above the nipples, and that the following standard table has been adopted by the army authorities as a basic regulation governing physical examinations, under the Selective Service Act of May 18, 1917. Under the revised regulations (June 5, 1918), however, the minimum permissible height is 63 inches,* and the weight 116 lbs., excepting registrants from our insular possessions:

* The minimum height under the regulations of May 18, 1917, has since been again reduced to 60 inches (July 19, 1918). The importance of the racial aspects of medical examinations for military service was brought up by Dr. O. L. Williamson, of Mariana, Ark., at the Conference of Physical Examination under the Selective Service (held in Chicago, June 13, 1918), who said that "Many physically fit negroes have not a chest mobility of two inches and they do not know how to expand the chest." The answer made by the chairman of the meeting was that this was entirely a local question and a problem for local disposition. The problem, however, can only be solved by a better understanding of the principles of physical anthropology and the known facts of race pathology.

STANDARD OF PHYSICAL PROPORTIONS ADOPTED MAY 18, 1917

STANDARD TABLE OF HEIGHT, WEIGHT AND CHEST MEASUREMENTS, UNITED STATES ARMY, 1917

HEIGHT		WEIGHT	CHEST MEASUREMENT	
Feet	Inches	Pounds	At Expiration Inches	Mobility Inches
5 1/12	61	118	31	2
5 2/12	62	120	31	2
5 3/12	63	124	31	2
5 4/12	64	128	32	2
5 5/12	65	130	32	2
5 6/12	66	132	32½	2
5 7/12	67	134	33	2
5 8/12	68	141	33¼	2½
5 9/12	69	148	33½	2½
5 10/12	70	155	34	2½
5 11/12	71	162	34¼	2½
6	72	169	34¾	3
6 1/12	73	176	35¼	3
6 2/12	74	183	36¼	3
6 3/12	75	190	36¾	3¼
6 4/12	76	197	37¼	3½
6 5/12	77	204	37½	3¾
6 6/12	78	211	38¼	4

It requires to be explained that the following variations below the standard are permissible when the applicant for military service is active, has firm muscles and is evidently vigorous and healthy.

PERMISSIBLE VARIATIONS IN PHYSICAL PROPORTIONS UNITED STATES ARMY, 1917

Height, Inches	Inches	Weight, Pounds
61 and under 64	1	8
64 and under 68	2	10
68 and under 69	2	12
69 and under 70	2	15
70 and under 73	2	20
73 and upward	2	24

It is quite probable that these variations are only tentative and that further and possibly even radical modifications may be introduced by the military authorities during the examination of the men called out in response to the Second Selective Draft.

ANALYSIS OF FOREIGN RECRUITING STATISTICS

For a considerable number of foreign countries in which the system of conscription prevails, more or less trustworthy statistics of recruiting are available, although in each and every case extreme care is required in the use of the data for comparative purposes. The terminology employed frequently does not permit of precise translation and occasionally it is impossible to determine whether the rates of

acceptance or rejection are based upon the number of conscripts at large or only those examined subsequently to a preliminary process of elimination. The most comprehensive treatise on the subject of recruiting statistics is the fifth volume of the Handbook of Military Hygiene by Bischoff, Hoffman and Schwiening, published in Berlin, 1913. Of much additional value is the article on Military Efficiency by Claassen in the Handbook of Social Hygiene, by Grotjahn-Kaup, published in Leipzig, 1912. The references to foreign statistics in handbooks on military and naval hygiene by American and English authors are exceedingly fragmentary and practically useless for trustworthy comparative scientific purposes. The whole question of normal physical growth and normal bodily proportions with a due regard to race, sex and age has been reported upon to best advantage for practical purposes by Dr. S. Weissenberg, Stuttgart, 1911. The conclusions arrived at by means of strictly scientific investigations are much more generally applied in the selection of recruits in foreign countries than in the United States or England, at least previously to the adoption of universal conscription. As observed in a recent contribution to the *Scientific American* (June 9, 1917): "There is an increased interest everywhere in physical measurements and the means of improving them when they are below par." But it is properly pointed out that "there is another factor besides height, weight, and girth of trunk or limbs, which is highly important in determining the military value of a soldier in the field, namely, endurance, or staying power."

INDEX OF VITAL RESISTANCE

The correct ascertainment of the degree of disease resistance on the one hand and of the resistance to physical and physiological fatigue on the other are as yet a subject unfortunately merely in a preliminary stage of qualified investigation. The scientific research work of A. F. Stanley Kent on Industrial Fatigue by physiological methods indicates a direction which can be followed to much practical advantage in the more rational development of training methods for new recruits and of endurance tests for mature men with sufficient military experience to make such tests relatively non-hazardous to health and life. As observed in an article in the *Scientific American* on Human Measurements and "Resistance Formulas," "The various corporal measurements commonly made, such as height, weight, circumference of normal and of expanded chest, respiratory amplitude, dynamometric force, girth of arms, legs, hips, etc., taken alone represent merely separate elements of strength and development." Among the various formulae for combining these factors and ascertaining a mathematical index of comparative robustness the one most generally employed and likely to yield the best results is said to be the one by Pignet, which is briefly stated as follows:

T—(P+C), in which T equals height in centimeters, P equals weight in kilograms, and C equals average circumference of chest in centimeters. For a man 1.72 meters tall, weighing 68 kg., and having an average chest measurement of 90 cm. this would give 172—(68+90) equal to 14. (5 ft. 7 in. tall, 149.6 lbs., weight, 35.1 inches, average chest measure.)

This index is used at the present time in Switzerland for the rating of recruits, the stamina or resistance of which is superior to the average in proportion as the index is smaller, and the larger the index figures the poorer is the physical constitution, with a due regard of the mathematical correlation of the more important anthropometric measurements. The following table shows the index value and the physical results, according to the Pignet method, as stated in the *Scientific American* previously referred to:

Index Value	Result
Low equals 10	Very good
11 to 20	Good
21 to 25	Average
26 to 30	Weak
31 to 35	Very weak
High equals 35	Inadequate

The Pignet index has recently been controlled or re-examined by individual measurements of more than a thousand young men, made by Dr. Fr. M. Messerli, in an endeavor to further perfect a system already apparently of a high degree of intrinsic usefulness. According to a recent number of the *Archives d. Sc. phys. et nat.,* as stated in the article referred to in the *Scientific American,* Messerli has succeeded "in rendering it more precise by introducing a new element: the average (B) of the circumference of the two arms (measured in the middle of the arm while extended), from which he subtracts the original formula of Pignet. The formula thus reads B—[T—(P + C)]. Taking the individual cited above, if he has an average brachial circumference of 25 centimeters, then his numerical index would equal 25—[172—(68 + 90)]=11. The numerous measurements made by Dr. Messerli cause him to conclude that every positive result may be regarded as good and every negative result as inadequate, the figure 0 being the limit of the index of the weak individuals (negative) and of that of the strong individuals (positive); the more the result is positive, the more the individual is resistant; the more negative the result, the weaker the individual."

LIMITED VALUE OF RECRUITING DATA

These preliminary observations indicate the very limited practical value of general recruiting statistics and anthropometric averages of height, weight and chest expansion for the purpose of ascertaining the facts of supreme importance as regards the physical stamina or resisting power of the recruiting material available for military service. All official statistics are furthermore subject to inherent limitations of trustworthiness not only on account of the want of uniformity in the

ascertainment of the physical proportions of recruits in different countries, but also because of the frequent changes in military rules and regulations, varying widely according to the available recruiting material and the numbers actually required to meet the exigencies of military service. Conclusions frequently advanced to the effect that the physique of any given country has improved or deteriorated on the basis of recruiting statistics are decidedly misleading and every authority on military statistics rejects unconditionally the assumption that the data can be used for the purpose of ascertaining physical progress or decay. The older recruiting statistics are therefore not comparable with modern statistics, and even these can be utilized for only a comparatively short period of time and a few of the more important countries of the world. For Germany the general statistics are perhaps the most extensive, but on account of the fact that the scientific details, especially as regards anthropometric averages, have not been made public by the Imperial Government they fall measurably short in practical usefulness of the corresponding statistics for France, for Scandinavia, for Italy, etc.

RACE IN RELATION TO PHYSICAL PROPORTIONS

Every authority on anthropology and anthropometry concedes the supreme importance of *race* as an underlying determining condition or consideration in the physical proportions or dimensions of the recruiting material under consideration. The term race is not one which permits of precise definition, for entirely pure races are certainly no longer met with in European countries. It is generally held that the average stature or the distribution, or more accurately, perhaps, the frequency distribution, of height according to age and sex, is more directly determined by heredity on the basis of racial antecedents than by any other physical factor excepting color, hair, skin pigmentation and the shape and size of the skull. Race, in however crude a sense the term may be used, is largely conditioned by the locality of birth of the recruiting material examined, and for the purpose of scientific conclusiveness the ratio of rejections for physical reasons or the anthropometric data ascertained by precise methods of measuring should be accurately correlated to the place of birth and not to the place of residence. Still more trustworthy and conclusive would be statistics of physique according to ancestry, which for practical purposes might be limited to the country of birth of the mother. This limitation has been found sufficient in mortality investigations, which exhibit the same definite relationship between disease predisposition or disease resistance on the basis of inherited ancestral traits as has been shown to be the case in the inheritance of physical proportions of the body, chiefly, however, in the average stature and its frequency distribution as determined by modern mathematical statistical processes.

The ratio of rejections on the ground of unfitness for military service varies widely for different countries, not so much because of inherent differences in vitality, physical strength or disease resistance, as on account of the precise rules and regulations applicable to the recruiting service, subject to far-reaching changes from time to time, especially during active military operations. Not only is the ratio of rejection governed by physical, physiological and pathological considerations, but, also, by social or economic interests precluding the advisability of using for military services men who for special reasons may be more useful to the State in the government service or in industry and private life. These considerations obviously must vary from time to time, and quite materially during prolonged periods of active military operations. In countries where the rule of conscription applies to all alike at a certain minimum age, the new recruits are, of course, only represented by a single year of life, for illustration, by age 20, except in so far as volunteers may be drawn upon from earlier ages or as those temporarily rejected may require to be re-examined at older ages, limited usually, however, to only a short period of years. In the United States in the future, if conscription continues, only the attained age 21 will require consideration, except in so far as new rules and regulations may provide for the re-examination of those rejected or temporarily declined at subsequent years. Since the minimum age of recruits varies for different countries and since the same conclusion applies to the rules and regulations regarding subsequent re-examinations, the statistics for any two countries are not strictly comparable and in some cases not at all.

RECRUITING STATISTICS OF PRUSSIA

In *Prussia,* during the year 1850, out of every 100 recruits examined, 64 were temporarily relieved from duty, while 36 were accepted, subject to examination. Of those accepted 11.2 per cent. were rejected as entirely unfit, and 10.8 per cent. as unfit for the field service, so that of those examined as required for service during the current year, 22 per cent. were finally declined. Of the remainder 28.1 per cent. were assigned to the supplementary reserves and 0.4 per cent. were declined for military service, including reasons involving personal integrity. An additional 4.6 per cent. of persons otherwise qualified were for domestic and other reasons assigned to the supplementary reserves, which with 9.2 per cent. of volunteers and 35.6 per cent. finally accepted, constitute 49.4 per cent. of the recruits examined as ultimately considered fit and useful for active service in the field (it is not entirely clear, but apparently the 4.6 per cent. were considered fit for military service in the field when so required and to be drawn from the supplementary reserves). When these statistics for 1850 are compared with those for 1860, it appears that profound changes had been introduced in the meantime, so that in the aggregate the general

results were materially modified. During the entire period 1847-62 the maximum rate of acceptance for military training was 55.6 per cent. in 1859, and the minimum 42.3 per cent. in 1856. At the beginning of the period the ratio was 43.8 per cent. and at the end of the period 48.5 per cent. The combined ratio of rejections as entirely unfit, however, reached the lowest figure in 1862, or only 10.1 per cent., against 20.7 per cent. in 1847. These earlier statistics of the Prussian military service are, of course, of only historical interest at the present time. They are not conclusive as regards the physical changes in the population during the intervening period and do not justify any conclusions whatever concerning the possible physical progress or deterioration of the German people. One of the most important variables in recruiting experience is the modification in the minimum standard of height, which in a measure depends upon the needs of the several arms of the service, in that usually a lower height is permissible for the cavalry than for the infantry and artillery. In Bavaria between 1853-65 the rejections on account of failure to conform to the minimum standard varied between 5.1 per cent. in 1855 and 1857 and 3.8 per cent. in 1865. It would obviously be misleading from these statistics to conclude that there had been a physical decline in the Prussian or Bavarian populations during the period under review, since the changes in military rules and regulations as regards the minimum standard of height in part at least explain the higher rejection ratio during the earlier in comparison with the later years.

STATURE OF GERMAN CONSCRIPTS

For more recent periods the German statistics are equally interesting, but far from conclusive. Innumerable changes in the rules and regulations appertaining to the examination of recruits and the acceptance or rejection of the same for military service make exact comparison of any one year with another of doubtful intrinsic value. The general average rate of acceptance in the German conscript recruiting experience is given by Claassen as 55.5 per cent. In addition, 14.9 per cent. are temporarily rejected but considered subsequently qualified, and 22.9 per cent. are assigned to the reserve as being of a restricted degree of ability for military service. No precise information is available as regards the reasons which govern in the respective assignments to the temporary or permanent reserves, but it is obvious that the former are considered more qualified for active military service than the latter, although both groups, representing a combined percentage of 37.8 of those subjected to final examination, are below the required standard of current army service represented by the 55.5 per cent. unconditionally accepted. Of the remainder 6.6 per cent. are considered entirely unfit for military service for physical or reasons

other than obvious moral grounds, probably convicts and persons otherwise undesirable, representing 0.2 per cent. of the conscripts subjected to final examination. These averages are based upon the returns for 1906-07, which are apparently normal and not influenced by urgent considerations of impending war.

The German rate of acceptance is, however, in a large measure determined by the number available for military service. That number naturally bears a direct relation to the authorized effective strength of the army. The rapid growth in the German population had made it possible to select conscripts with much greater care than in certain other countries, especially France, where the available material has rarely if ever within recent years been fully sufficient to meet the required complement in accordance with the authorized strength of the French army. For this reason the French statistics cannot be considered strictly comparable with the German statistics, and the fact that the average rate of acceptance was 72 per cent. in France, against 66 per cent. in Germany, is not evidence of the physical inferiority of the German recruiting material and its unsuitability for military service. The discussion by Claassen includes the average rate of acceptance for various countries, but for different periods of time, all, however, subsequent to 1899. For Russia the rate is given as 85 per cent.; for Norway, 76 per cent.; for Sweden (Province of Dalarne), 75 per cent.; for France, 72 per cent.; for Switzerland, 58.5 per cent., and for Germany, 55.5 per cent.

Another even more important factor which requires consideration is the question as to how the number finally examined is constituted or determined for military purposes. If, for illustration, those who are seriously impaired in physique or who are mentally unsound or who are below height are not required to present themselves at all but are excused on grounds sufficient to a lay official, then the rate of rejections on final examinations would, of course, be correspondingly diminished. It is generally understood that this is the case in France, although the rate of final rejections as entirely unfit is 10.1 per cent., against 6.6 per cent. for Germany. The interpretation of foreign recruiting statistics is unfortunately further impaired by a strong bias which precludes to a considerable degree the practical use of the data available in a summarized form.

INCONCLUSIVE ARMY REJECTION DATA

The causes of rejection in recruiting as in the case of the so-called causes of death are for statistical purposes limited to assumed primary or determining causes, while secondary, although possibly equally important, causes of rejection are obscured in the prevailing method of statistical tabulation and analysis. If, for illustration, a recruit is rejected because of deficiency of stature, it does not at all follow that

he would not also have been rejected on account of an organic impairment of the heart, or mental deficiency. The *causes* of rejection, therefore, as presented in the usual form in army medical reports are not conclusive evidence as regards the existence or co-existence of impairments, defects and deficiencies of a physical or pathological nature. Limited to the crude method of statistical presentation, the recruiting statistics according to causes of rejection are therefore merely indicative of the determining causes or reasons sufficient for military purposes to justify the unconditional rejection of the recruit as unfit for military service in time of peace or war. For a considerable number of specific causes of rejection, such as goitre, for illustration, or flatfoot, the available statistics are reasonably conclusive, and usually in conformity to the known facts of local frequency of special diseases or special forms of physical disability. In the German experience for the period 1904-08, out of every 100 recruits subjected to final medical examination an aggregate of 49 were rejected or declined, or, respectively, 19.3 per cent. on account of general debility, 7.2 per cent. on account of internal diseases, etc., 4.6 per cent. on account of diseases, or defects or deficiencies of the eyes and ears, 11.9 per cent. on account of external diseases and malformations, 0.8 per cent. on account of deficiency in stature, and 5.2 per cent. for other causes. The details are of exceptional practical importance, but absolute accuracy in the conclusions is precluded by the fact that the term "general debility," which in the German experience accounts for 19.3 per cent. of those permanently rejected on final examination, includes numerous causes and conditions more or less complicating other causes and conditions specifically referred to as reasons for final rejection, but chiefly retarded bodily development, general weakness, partly in consequence of previous diseases or injuries, deficiency in bone or muscle formation, deficiency in chest development, etc. There are reasons for believing that in a number of cases, sufficient to require special consideration, the apparent unfitness for military service was after all only of a temporary nature, suggestive of the advantage of special training or curative processes, etc. In the majority of cases the reasons for declining applicants on the ground stated have probably much to do with retarded physical or physiological development, not only of the body as a whole but of the separate organs and parts, subsequently successfully overcome by the attainment of normal growth and development during the remaining years previous to complete physical maturity.

REJECTION DATA OF THE GERMAN ARMY

In the order of their importance the reasons for final rejection on the ground of complete and permanent military unfitness in the German army during the years 1904-08, aside from the rejections on account

of general debility, accounting for 19.3 per cent. of the total number examined, the first cause of importance is rejections on account of diseases or impairment of the heart and circulatory organs, accounting for 3 per cent., followed by minor defects but of sufficient military importance to justify rejection, also equivalent to about 3 per cent., and recognized defects and deformities of the extremities, equivalent to 2.9 per cent. Of the remainder of principal causes of rejection, flatfoot accounted for 2.1 per cent., hernia for 2.1 per cent., errors of refraction for 2.0 per cent., varicose veins, etc., for 1.8 per cent., and physical deformities, chiefly spinal curvature, for 1.8 per cent. Goitre in the German experience is of relatively slight importance, accounting for only 0.4 per cent., varying, however, between a minimum of 0.3 per cent. in the Prussian army and 1.2 per cent. in the army of Württemberg. Bad teeth accounted for only 0.21 per cent., rheumatism and gout for only 0.17 per cent., and corpulence for 0.14.

Of special military significance is the relatively high rate of rejections on account of flatfoot, which varies from a minimum of 1.1 per cent. for the Bavarian to a maximum of 2.4 per cent. for the Prussian army. Disease of the lungs caused a rejection rate of only 1 per cent., with but a slight range in variations in the rate for the fundamental constituent armies of the German Empire, or, respectively, Prussia, Bavaria, Saxony and Württemberg.

The changes in the rejection rate during recent years in the German army experience, or specifically during the period 1904-10, are not suggestive of an improvement in the physical type or the disease resistance of the recruits, since the ratio of the unfit for military service has gradually increased from 48.7 per cent. in 1904 to 54.3 per cent. in 1910. The increase has chiefly fallen upon the groups of rejections for general debility, from 18.2 to 22.3 per cent., diseases of the heart and circulatory organs, from 2.7 to 3.8 per cent., and diseases of the lungs, from 0.9 to 1.4 per cent. The rejections on account of deficiency in stature declined from 0.73 per cent. to 0.61 per cent. These changes, however, in the recruiting results can no more, as elsewhere observed, be relied upon as evidence of physical deterioration than that, conversely, a declining rate of rejection for specified causes can be safely utilized for the purpose of proving physical advance. The rates are governed primarily by military considerations, which vary with army requirements almost from year to year. The rates are also affected by improvements in methods of physical diagnosis, in connection with which to an increasing extent use is made of instruments of precision, in place of entire reliance upon the objective and subjective symptoms ascertained by non-instrumental methods in physical and medical examination.

GEOGRAPHICAL VARIATIONS IN THE CAUSES OF REJECTIONS

Most valuable for practical purposes is the analysis of the German recruiting statistics according to causes of rejection by army corps, which broadly correspond to the principal geographical and topographical divisions of the Empire. These statistics indicate with approximate accuracy the local excessive incidence of physical or other impairments sufficiently serious to cause the final rejection of recruits for military service. Thus, for illustration, in the ratio of rejections for *diseases of the lungs* during the period 1904-08 the maximum rate was 20.8 per 1,000 for the 55th Brigade of the 14th Army Corps, whereas the minimum rate was only 3.8 per 1,000 for the 21st Brigade of the 6th Army Corps (Prussia). For *flatfoot* the rejection rate varied between a maximum of 44.6 per 1,000 in the 33rd Brigade of the 9th Army Corps to a minimum of only 6.2 per 1,000 for the 45th Brigade of the 12th Army Corps (Saxony). For *goitre* the rejection rate varied between non-occurrence in the 35th Brigade of the 9th Army Corps to a maximum of 23.2 per 1,000 in the 4th Brigade of the 1st Army Corps (Bavaria). When shown in graphic form these rates of rejection according to locality furnish evidence of exceptional value in the practical furtherance of public health movements, suggestive of the urgency of highly specialized local inquiries regarding underlying causative or contributory conditions or circumstances possibly within the range of prevention and control. To be scientifically conclusive it, however, is necessary that the rejection rates should be calculated according to the place of birth or at least the usual or prolonged residence of the examined recruit rather than according to the recruiting locality, which might have no bearing upon the causative conditions or circumstances responsible for the frequency of certain defects and deficiencies, such as goitre, flatfoot, etc. To ignore racial antecedents in recruiting statistics is as certain as in mortality statistics to lead to seriously erroneous results; for broad general averages derived from a heterogeneous group of persons examined cannot possibly serve as a standard properly applicable to widely varying constituent parts.

RECRUITING STATISTICS OF AUSTRO-HUNGARY

No country illustrates the importance of racial consideration more conclusively than the *Austro-Hungarian Monarchy*. The statistics available are neither for very recent years nor in such detail as to justify their use in comparison with the returns for adjacent European countries. The tendency has been apparently towards a diminution in the proportions rejected on account of deficiency in stature and a lesser proportion of recruits of short stature and a larger proportion of those above the average in height according to age. The rejection rates by causes are based upon the numbers examined above the minimum

stature, which was 155.4 cm. in 1888, but reduced to 153 cm. in 1889. Of those examined from 1894 to 1905, some 43 per cent. were declined on account of general weakness, 3.3 per cent. for varicose veins, 3.1 per cent. for intestinal dislocations (hernia), 2.8 per cent. for goitre and 2.4 per cent. for flatfoot. The proportion rejected on account of errors of refraction was 0.7 per cent., and for other diseases of the eyes 1.4 per cent. Defective dentition caused a rejection rate of 0.4 per cent. and valvular affections of the heart 0.24 per cent. It is remarkable that tuberculosis of the lungs caused a rejection rate of only 0.08 per cent., which may be accepted as evidence that by some other previous process of selection those predisposed to pulmonary tuberculosis did not come up for final military examination at all. The general rejection rate is relatively high for Austria, but the rules and regulations have so frequently been changed during the last forty years that no definite conclusions can be safely advanced, excepting possibly for certain clearly recognized causes. Rejections for general debility increased from 27.9 in 1870 to 44.3 per cent. in 1905. All forms of tuberculosis decreased from 0.61 per cent. to 0.57 per cent. Flatfloot decreased from 3.4 per cent. to 2.8 per cent., while goitre decreased from 4.7 per cent. in 1871 to 2.9 per cent. in 1905. There was a remarkable reduction in the rejection rate on account of intermittent malarial fever from 0.12 per cent. at the beginning of the period to 0.02 per cent. at the end. Specific rejections for malaria were highest in the southern province of Zara of Dalmatia (1.15 per cent.), while rejections on account of goitre were highest in the Innsbruck district of Tyrol (9.5 per cent. of the total examined). These averages are for the decade ending with 1905, and given by regional divisions of the Austro-Hungarian Empire, but not in such detail as the German statistics, regardless of equally wide variations in local, racial and topographical conditions.

The Austro-Hungarian statistics are of special interest as regards variations in stature according to race, it being shown that per thousand examined during 1894-1905 in the Zara district of Dalmatia the proportion of conscripts below 153 cm. was only 5 per 1,000, or the lowest on record, against 60 per 1,000 in the Przemysl district. Conversely the tallest races were met with in Dalmatia and Croatia, or, respectively, 53.2 and 31.2 per cent. of 171 cm. and over, against a general average of 22.2 per cent. for the Austro-Hungarian Empire and 14.2 per cent. for the district of Przemysl. Croatians are the tallest, followed by the Czechs, Moravians and Slavs. The Germans occupy an average position, while the Roumanians, Magyars and Ruthenians are distinctly below the average, returning, in any event, a lesser proportion of those 171 cm. in stature and over. The Poles show the largest proportion under 160 cm. and the smallest proportion of 171 cm. and over. The Austrian statistics do not justify the assumption frequently given

utterance to that short and medium sized men are in the main stronger and more suitable for military service than tall recruits, or at least this conclusion is not the fact, according to Schwiening, for Germany and Austro-Hungary.

RECRUITING STATISTICS OF FRANCE

The recruiting statistics for *France* extend over a long period of years, but there have been so many changes in rules and regulations that conclusions require to be arrived at with extreme caution. There has apparently been a decrease in the proportion of recruits below the minimum standard, but the available data are of more or less doubtful intrinsic trustworthiness. The rate of rejections on the ground of entire unfitness is, as previously stated, relatively low for France compared with Germany, but the difference is probably more attributable to lax rules and regulations or to the urgent necessity of bringing the authorized strength of the army to its full quota rather than to a superior physique or physiological condition. In 1901 the provision as regards minimum stature was removed and recruits even below 154 cm. were accepted. It is explained that in consequence of changes in the rules and regulations by 1902 the proportion of accepted recruits had increased to 87.3 per cent., and the high rate was obviously indicative of the urgent demand of the army to make use of the largest possible proportion of the available recruiting material. During 1906-10 the average ratio of rejections on account of entire unfitness for military service was 9.6 per cent. for France, having been as high as 14.8 per cent. for the military district of Rennes and as low as 7.1 per cent. for the military district of Nancy.

During the period 1907-10 the ratio of rejections for all causes was 9.8 per cent., of which 3.3 per cent. was on account of general debility; 1 per cent. on account of diseases of the nervous system; 0.8 per cent. on account of diseases of the eye; 0.36 per cent. on account of diseases of the ear and 0.2 per cent. on account of diseases of the respiratory organs. The data are not in sufficient detail to justify definite conclusions and they are complicated by the fact that the French figures are given separately for those entirely unfit and those useful for auxiliary military service, which constitute 4.2 per cent. of those rejected for all causes. In more detail, it may be said in this connection that combining the two groups of the entirely and the largely unfit for military service the rejection rates for the period 1907-10 were as follows: Diseases of the bones and extremities, 2.4 per cent.; physical weakness or debility, 1.9 per cent.; tuberculosis, 1.2 per cent.; varicose veins, 0.9 per cent.; errors of refraction, 0.8 per cent.; other diseases of the eye, 0.6 per cent., and diseases of the heart, 0.5 per cent. Rejections on account of hernia amounted to 0.4 per cent. and of goitre 0.1 per cent. Retrospectively the statistics for France cover the period 1873-1910,

but, as stated before, the data require to be used with extreme caution. In view of the alleged prevalence of tuberculosis among the French troops during the present war, it is extremely significant to find that the ratio of rejections for tuberculosis of the lungs increased from 0.23 per cent. in 1885 to 0.59 per cent. in 1905. For more recent years not all of the details are available. Goitre of all forms decreased from 0.5 per cent. in 1887 to 0.1 per cent. during 1907-10. Hernia decreased from 2.7 per cent. in 1887 to 0.4 per cent. during 1907-10, while flatfoot decreased from 0.46 per cent. in 1887 to 0.19 per cent. in 1905. There was a decided decline in rejections on account of general debility, from 3.0 per cent. in 1873 to 0.7 per cent. in 1905; but during the period 1907-10 the rate increased quite considerably, or, specifically, to 1.6 per cent., a figure not reached before since 1882. There are reasons for believing that this apparently considerable decline in the frequency of general debility is more apparent than real, and that in all probability the increasing demand for the largest possible number of acceptable recruits accounts for the falling off in the rejection rate, applying to a group of physical defects difficult of exact diagnosis or adjudication for recruiting purposes.

The frequency of tuberculosis in France among recruits has been ascertained for the different army corps according to departments, and a startling range in the variation of the local incidence has been disclosed, the accuracy of which has unhappily been confirmed by the experience during the early part of the present war. The highest ratio of tuberculosis is met with throughout the Northern Department, but chiefly in the Department of the Northwest. In contrast, the frequency of heart disease or organic heart impairment was decidedly more common in the more or less mountainous provinces. The proportion of recruits of a deficient stature was lowest in the Northeastern Department of France. And approximately this conclusion holds good for the Middle Departments, while in the Northwestern section and the West and South, practically throughout, the percentage of recruits below 162 cm. was below the general average. Proportionately the largest number of short recruits came from the Bretagne, as well as from the Southwest, chiefly Gascogne and Guiene.

VARIATIONS OF STATURE OF EUROPEAN ARMIES

Schwiening gives a table of percentages for four different European countries, according to which out of every 100 recruits examined the following were of the proportion of less than 160 cm. in stature: Württemberg, 11.8 per cent.; Prussia, 13.0 per cent.; Bavaria, 14.7 per cent., and Austro-Hungary, 22.9 per cent. The proportion of tallest recruits, or such as had a stature of 170 cm. and over, was highest in Prussia, 31.1 per cent., followed by Württemberg, with 27.7 per cent., Bavaria, 27.1 per cent., and Austro-Hungary, 22.1 per cent.

Claassen gives another comparison according to which the proportion of soldiers or recruits of less than 165 cm. in stature was for German soldiers in 1906 29.8 per cent., for German recruits during 1899-1903 40.2 per cent., and for French recruits during 1906 43.2 per cent. The proportion of tall men, or those 170 cm. or over, was largest among German soldiers, or 35.7 per cent., followed by German recruits, with 29.6 per cent., and French recruits, with 25.6 per cent. Evidently such comparative anthropometric averages must be used with extreme caution and upon a thorough understanding that the statistics apply either to soldiers or to recruits, and if to the latter whether the averages apply to accepted recruits or to the entire recruiting material subjected to a preliminary physical examination.

RECRUITING STATISTICS OF ITALY

The available recruiting statistics for *Italy* are for the period 1875-1909. The rejection rate has varied considerably, between a maximum of 29.7 per cent. of those examined in 1906 and a minimum of 17.7 per cent. of those examined in 1882. The fluctuations in rates, however, are such as to make it evident that the results are strongly influenced by recruiting requirements. The rejection rate on account of deficiency in height has changed from a maximum of 10.2 per cent. in 1876 to 4.2 per cent. in 1909, which is the lowest rate on record for the period. There has been an increase in the rate of rejections on account of disease from a minimum of 10.1 per cent. in 1882 to 24.8 per cent. in 1906. For the year 1909 the rate, however, was only 20.2 per cent. The practice prevails in Italy of temporarily declining recruits who apparently remain subject to further examination and possible acceptance. The rate of such rejections for the year 1909 was 28 per cent. of the total number examined. In this group also the rejections on account of deficiency in stature during recent years have been considerably below the former average, the rate having been 1.4 per cent. in 1909, against a maximum of 5.3 per cent. in 1882. That these statistics cannot be relied upon as measurable evidence of physical deterioration is made clear by the fact that, while in 1881 the rejection rate on account of deficiency in stature was 3.3 per cent., it was 5.3 per cent. in 1883, and only 2 per cent. in 1884.

The aggregate rate of acceptance was as high as 63.3 per cent. in 1877, and as low as 41.8 per cent. in 1906; but there was an increase to 44.0 per cent. in 1907, 43.4 per cent. in 1908, and 47.7 per cent. in 1909. Evidently the rates have no direct bearing upon the question of physical deterioration or improvement. The Italian statistics are impaired by the increase in the proportion of those who were absent; accounted for in a large measure by the enormous Italian emigration. The statistics of deficiency in height are affected by the law of 1882, which fixed the minimum stature at from 154 to 156 cm., but the maximum was reduced from

156 to 155 in 1883. The law of 1889 changed the chest measurements, and a chest circumference of 75 cm. or less made rejection permanent and from 75 to 80 cm. temporarily effective. The minimum of 75 cm. was changed in 1896 to 77 cm. It is held that the increase in the rejection rate cannot be considered conclusive evidence regarding the physical deterioration of the Italian recruiting element. The increase is largely explained by changes in the rules and regulations and more rigid methods of examination. The rejection rate has varied widely from an average of 39.6 per cent. for the country as a whole during the period 1906-08; a minimum of 29 per cent. in the Province of Lazio and a maximum of 62.9 per cent. in the Province of Sardinia. In a general way the highest proportion of acceptance was in the middle and northeast of Italy, and the lowest proportion in southern Italy and in the northwest Province of Lombardy. The rejections on account of minimum stature were lowest in the Province of Venetia, or 2.5 per cent., and highest in the Province of Sardinia, or 20.4 per cent. For all Italy the rejection rate on account of minimum stature during 1906-08 was 6.7 per cent. of the total number examined.

MEDICAL CAUSES OF REJECTION IN THE ITALIAN ARMY

The medical causes of rejection were as follows: General physical debility accounted for 5.14 per cent. of examined recruits; deficiency of chest formation, respiratory function, etc., 4.05 per cent.; and scrofula, anemia, weakness, etc., 1.96 per cent., a combined aggregate of 11.15 per cent. Following these general causes, diseases of the eye, including errors of refraction, accounted for 2.07 per cent., diseases of the extremities and of the bones, for 1.94 per cent., hernia, for 1.53 per cent., goitre for 1.23 per cent., and spinal curvature and physical defects of the chest, for 1.21 per cent.

During the period 1878-1909 there were important changes in the rejection rates of Italian recruits for specified causes, but the data require to be interpreted with extreme caution. Thus, for illustration, the rejections for general physical deficiency were 6.07 per cent. in 1895, 12.57 per cent. in 1896, and 8.61 per cent. in 1897. In 1906 the rate was 13.2 per cent.; in 1907, 11.4 per cent.; in 1908, 10.6 per cent., and in 1909, 9.0 per cent. These rates evidently have no direct bearing upon a tendency towards physical deterioration or advance, as the case may be. Goitre, however, shows a distinct rate of increase, from a minimum of 0.56 per cent. in 1883 to a maximum of 1.42 per cent. in 1905. Subsequently to that year the rate is shown to have gradually declined to 0.89 per cent. in 1909. Lung diseases show a perceptible decline, but heart diseases show a decided increase. This, however, may be largely in response to the more thorough examination of recruits. Hernia has shown a slight increase from 1.46 per cent. in 1878 to 1.64 per cent. in 1909. The conclusion is advanced that the

increase in rejections on account of heart affections from a minimum of 0.08 per cent. in 1881 to a maximum of 0.4 per cent. in 1908 cannot be evidence of an actual increase, but is more likely the result of more rigid methods of examination. As regards goitre it appears that the disease was practically limited to the most northern provinces of Italy, adjoining those of Switzerland and Austria in which the disease is correspondingly frequent.

RECRUITING STATISTICS OF SWITZERLAND

The recruiting statistics of *Switzerland* are available only for the period 1875-1904. The general rejection rate on account of unfitness for military service has varied between a maximum of 46.6 per cent. during 1879 and a minimum of 31 per cent. in 1876. For the year 1904 the rate was 40.1 per cent. The opinion is advanced that the changes are largely in consequence of more rigid methods of examination and not directly related to material alterations in the physique of the Swiss population. Comparing the returns by quinquennial periods for the last twenty-five years, it appears that there have been changes in the rejection rate for specified causes, but the data require to be considered or interpreted with extreme care. General weakness, anemia or convalescence was the cause of rejection of 6.1 per cent. of those examined in 1875-84, the rate having gradually declined to 3.3 per cent. in 1901-05. Rejection on account of deficiency in stature decreased from 6.5 per cent. in 1886-90 to 3.7 per cent. in 1901-05. Rejections on account of tuberculosis of the lungs, however, increased from 0.3 per cent. during 1886-90 to 0.6 per cent. in 1901-05. Rejections on account of diseases of the heart and circulatory organs increased gradually from 0.7 per cent. during 1875-84 to 1.7 per cent. during 1901-05. Rejections on account of goitre increased from 5.8 per cent. during 1875-84 to 7.1 per cent. during 1886-90, subsequently declining to 6.1 per cent. during 1901-05. The rejection rate for hernia remained practically stationary, having been 2.7 per cent. during the last five years of the period under observation, while rejections on account of flatfoot increased from a minimum of 2.3 per cent. during 1886-90 to 4.1 per cent. during 1901-05. The significant facts about the Swiss recruiting statistics are the high rejection rates for general weakness, anemia, etc., minimum stature, diseases of the heart and circulatory organs and, most of all, goitre, which continues as the leading cause of rejection in Swiss recruiting at the present time. Errors of refraction accounted for rejections of 5.6 per cent. of the examined during 1901-05, against a minimum of 1.9 per cent. during 1874-84. The increase was probably more the result of improvement in methods of eye examination than an actual increase, although there are some reasons for believing that errors of refraction are progressively on the increase in practically all the leading European countries as a cause of rejection in recruiting statistics.

RECRUITING STATISTICS OF SCANDINAVIAN COUNTRIES

For the *Scandinavian* countries the statistics of *Denmark* are suggestive of an increase in the rate of rejections on account of unfitness for military service from 29.0 per cent. during 1891-95 to 41.3 per cent. during 1906-10. * The rejection rate has varied between a maximum of 47.6 per cent. in the First Military District to a minimum of 37.5 in the Fourth Military District. These rates are for the period 1905-09. The principal causes of rejection during 1906-10 were 2.95 per cent. on account of general bodily weakness, 2.22 per cent. for diseases or defects of the eyes, 1.38 per cent. for diseases or defects of the ears, 1.5 per cent. for diseases of the lungs, 2.7 per cent. for diseases of the heart and 5.99 per cent. for diseases or physical defects of the feet. The rejection rate for all causes was 41.3 per cent. for the period under review. The rejections for deficiency in stature decreased from a maximum of 0.48 per cent. of those examined during 1891-95 to a minimum of 0.24 per cent. during 1906-10.

For *Norway* the recruiting statistics from 1878 to 1910 are indicative of conditions quite at variance with those reported upon for Denmark. The rejection rate during 1910 was 20.7 per cent., the rate having changed during the period under review from a maximum of 26.6 per cent. in 1880 to 18.3 per cent. in 1890. The rejection rate was highest in the Third Military District (Kristianssand), or 22.9 per cent., and lowest in the Tromsoe District, or 16.6 per cent. The principal causes of rejection were as follows: Diseases of the extremities, 7.1 per cent.; diseases of the eyes and errors of refraction, 4.4 per cent.; diseases of the lungs, 2.6 per cent.; diseases of the ears, 2.5 per cent.; diseases of the heart, 2.3 per cent.; hernia, 2.2 per cent.; bodily weakness, 1.5 per cent.; spinal curvature, etc., 1.9 per cent.; diseases of the nose and mouth, 1.1 per cent., and all other diseases and defects and deficiencies, 6.3 per cent. The average rate for all causes was 31.1 per cent. for the period 1904-08. The Norwegian returns, however, are for both the entirely unfit and those temporarily unfit, which makes a comparison with other recruiting statistics of doubtful validity. The average stature of Norwegian recruits has been ascertained for a long period of years, having gradually increased from a minimum of 168.7 cm. during 1878-82 to 170.8 cm. during 1908-09.

For *Sweden* the recruiting statistics are for the period 1890-1907. The general rejection rate gradually declined from a maximum of 26.3 per cent. during 1901 to 18.1 per cent. during 1907. These rates do not include those temporarily rejected, or those whose acceptance for actual service was postponed. A minimum rate of only 12.4 per cent. was reported for the Gotland District and a maximum rate of 25.6 per cent. for the Sodermanland District. These rates apply only to the

* The rate declined, however, again during the period 1911-15 to 29.5 per cent.

recruits 21 years of age examined during 1903-07. The principal causes of rejection during the same period were as follows: Diseases of organs of circulation, including the heart, 4.37 per cent.; diseases of bones and extremities, 3.43 per cent.; deafness and diseases of the ears, 1.58 per cent.; tuberculosis, 1.57 per cent.; general debility, 1.5 per cent.; diseases of the eye, 1.36 per cent.; diseases of the mind, 1.07 per cent., and deficiency in stature, 0.53 per cent. For all causes the rate was 18.58 per cent., limited, as previously stated, to those 21 years of age only. For those examined at older ages the rejection rate for all causes was 26.12 per cent., and for diseases of the heart and circulatory organs, 5.65 per cent., and for tuberculosis, 2.86 per cent. The large group of rejections on account of diseases of the circulatory organs apparently includes varicose veins, etc.

RECRUITING STATISTICS OF BELGIUM

For *Belgium* the available recruiting statistics are for the period 1901-09. The general rejection rate having varied between a maximum of 34.27 per cent. at the beginning of the period to 19.26 per cent. during 1907, when, however, radically different methods of examination appear to have been employed. The rate increased to 29.34 per cent. in 1908, and declined to 25.63 per cent. in 1909. The rejection rate was highest in the District of Brabant, or 40.7 per cent., during the period 1902-06, and lowest in the District of Luxemburg, or 18.3 per cent., the average for all districts for the period having been 31.7 per cent.

The principal cause of rejection in Belgium during 1902-06 was general debility, accounting for 7.97 per cent. Diseases or defects of the extremities caused 5.0 per cent.; deficiency in stature, 2.27 per cent.; varicose veins, etc., 1.85 per cent.; hernia, 1.63 per cent.; flatfoot, 0.27 per cent.; tuberculosis of lungs, 0.15 per cent., and goitre, 0.13 per cent. Wide variations in causes of rejection were reported for the different provinces. For illustration, physical debility accounted for a rejection of 12.6 per cent. of those examined in the District of Brabant, but for only 1.97 per cent. in the District of Luxemburg. Rejections on account of diseases of the heart and circulatory organs accounted for 1.77 per cent. in the District of Hennegau, but for only 0.1 per cent. in the District of Luxemburg. Goitre accounted for a maximum rate of 0.53 per cent. in the District of Liege, but for only 0.009 per cent. in the District of West Flanders. Rejections on account of deficiency in stature varied from an average of 2.27 per cent. for the entire kingdom, a maximum of 2.64 per cent. for the Province of Liege and a minimum of 1.33 per cent. for the Province of Limburg.

RECRUITING STATISTICS OF HOLLAND

For *Holland* the available recruiting statistics are only for the period 1903-07. The average rejection rate was 19.8 per cent. of the ex-

amined, having been as high as 24.9 per cent. in one district and as low as 15.8 in another. The principal causes of rejection were diseases and defects of the eyes, 6.1 per cent.; general debility, including anemia, etc., 1.9 per cent.; followed by flatfoot and other diseases of the feet, 1.5 per cent.; spinal curvature, etc., 1.5 per cent.; diseases of the ears, 0.95 per cent.; hernia, 0.9 per cent.; diseases of the heart, 0.6 per cent.; tuberculosis of the lungs, 0.6 per cent., and goitre, 0.09 per cent. Aside from diseases of the heart, however, heart murmurs, etc., accounted for 0.3 per cent. of the examined, a total of 0.88 per cent. for all diseases of the heart, as far as reported. Of special significance is the relatively high rate of rejection on account of spinal curvature, which, however, may be explained by special attention to an impairment frequently not recognized by superficial examinations.

Of special interest in the statistics of Holland are the anthropometric data, which extend over the period 1863-1910 and which indicate a persistent decline in the proportion of recruits of a stature of less than 155 cm. and an increase in the proportion of those of 170 cm. and over. At the beginning of the period the proportion of minimum stature was 11.09 per cent. of those examined, against 1.98 per cent. at the end. The proportion of a stature above 170 cm. was 24 per cent. during 1863-67, which by 1906-10 had increased to 54.61 per cent. Whether this increase, however, is not more apparent than real is not made clear by the statistics, which are suggestive of extreme caution in connection with their use as regards the probable physical improvement of Dutch recruits. The stature varies considerably for the different provinces. The proportion below the prescribed minimum of 155 cm. has been as high as 3.74 per cent. in one district and as low as 0.88 per cent. in another during the last quinquennial period for which the information is available. The general conclusion, however, would seem justified that the proportion of recruits below the average stature is now less in Holland than in former years.

RECRUITING STATISTICS OF RUSSIA AND FINLAND

The recruiting statistics of *Russia* and of *Finland* are too fragmentary to permit of definite conclusions. For Finland the ratio of permanently rejected recruits has varied considerably from year to year, having been at a minimum of 20.25 per cent. during 1903 and a maximum of 62.69 per cent. in 1894. The returns indicate the decided influence of changes in rules and regulations and cannot be accepted without an analysis in detail, for which the data are at present not available.

RECRUITING STATISTICS OF GREAT BRITAIN

The recruiting statistics for *Great Britain* are not comparable with those of the countries thus far examined or discussed, in that they relate exclusively to volunteers instead of to conscripts, and to a class of volunteers which cannot be considered typical of the British male popula-

tion of the recruiting age. During 1910 the rejection rate was 30.9 per cent., the rate since 1891 having been as high as 42.35 per cent. in 1896 and as low as 28.1 per cent. in 1900. The rates show throughout the strong influence of recruiting necessities, as, for illustration, during the years 1900-01, on account of the South African War. During 1906-10 the principal causes of rejection on initial examination were as follows: Deficiency in chest measurement accounted for 5.3 per cent. of those examined; dental defects and deficiencies, 5.2 per cent.; visual defects and deficiencies, 2.8 per cent.; diseases of the heart, 2.8 per cent.; deficiency in stature, 1.18 per cent.; deficiency in weight, 1.16 per cent.; flatfoot, 0.88 per cent.; hernia, 0.8 per cent.; spinal curvature, 0.53 per cent. (for Holland the corresponding proportion of rejection was 1.48 per cent.).

In the English statistics forty specific causes of rejection are enumerated, some of which, apparently, are not recognized in the recruiting statistics of the Continent. Of special significance is the high rejection rate on account of deficient chest development or chest measurement, which to a certain extent is explained by the class of recruits accepted on a basis of voluntary enlistments. There have been profound changes in this respect, however, during recent years, and the proportion rejected on account of deficiency in chest measurement or chest proportion was as high as 13.98 per cent. in 1896, and as low as 4.96 per cent. during 1906. Equally important changes have occurred in the rejection on account of underweight, the rate on this account having been as high as 4.56 per cent. in 1897, and as low as 0.41 per cent. during 1908. The misleading character of these returns as evidence of physical deterioration is best illustrated by the fact that the rate of rejections on account of underweight was 2.33 per cent. of those examined in 1907, only 0.4 per cent. during 1908, 0.46 per cent. during 1909, but 1.47 per cent. during 1910. In further contrast the rate was as high as 4.0 per cent. during the year 1893, but during the preceding year it was only 2.8 per cent. The rejection rate on account of tuberculosis has also varied considerably, or between a maximum of 0.26 per cent. during 1894 and 0.07 per cent. during the preceding year. Rejections on account of hernia have remained fairly stationary, the fluctuation being limited between a maximum of 0.95 per cent. during 1908 and a minimum of 0.71 per cent. during 1895. Of special significance is the decline in the rejections on account of syphilis, which reached a maximum rate of 0.51 per cent. in 1894 and a minimum of 0.18 per cent. during 1908-09.

RECRUITING STATISTICS OF JAPAN

The only other available statistics for foreign countries are those of *Japan*, limited to the period 1903-09. As far as it is possible to judge, the ratio of rejections was 10.8 per cent. of those examined during the

period 1905-09. No statistics are published regarding the causes of rejection, but some interesting data are available regarding the distribution of troops by stature, which seem to indicate a gradual decline in the proportion of those below 148.5 cm. Comparing the returns for Japan and those for certain other countries, it appears that the proportion of those of a stature of 160 cm. and over (63 inches) was 87.0 per cent. for Prussia, 69.9 per cent. for France, 57.0 per cent. for Austro-Hungary, but only 3.1 per cent. for Japan.

RECRUITING STATISTICS OF THE UNITED STATES

The comparative value of the preceding statistics is very limited. It is not only difficult to scientifically define the prevailing standards of military fitness in the different countries for which recruiting statistics are available, but the standards themselves have varied so frequently and have been so strongly influenced by military requirements that all international conclusions must be arrived at with extreme caution. Schwiening includes, however, certain statistics for the United States which may be referred to, since nearly all of the preceding data are derived from his elaborate work on Recruiting Statistics (Lehrbuch der Militärhygiene, vol. v.) which, unfortunately, has not been translated into English. According to Schwiening, the rejection rate for American recruits, which, of course, represent volunteers, is not strictly comparable with the returns for conscripts, on the one hand, nor exactly with the volunteer statistics of England, on the other, for there are reasons for believing that the English statistics represented previously to the war a class physically distinctly below, in age and physique, the corresponding class of applicants for military service examined and accepted in the United States.

The general (medical) rejection rate for 1906-10, according to this author, was 13.69 per cent., having been 13.8 per cent. for the white, and 10.5 per cent. for the colored. The principal cause of rejection among the white was diseases of the eyes and errors of refraction, or 1.57 per cent. of those examined, followed by sexual diseases, 1.23 per cent.; diseases of the ears, 1.07 per cent.; diseases of the heart, 1.03 per cent.; underweight, 0.79 per cent.; dental defects, 0.69 per cent.; alcoholism, 0.65 per cent.; flatfoot, 0.57 per cent., and hernia, 0.54 per cent. It is extremely significant that general debility should be such a rare cause of rejection in the United States Army, only 0.06 per cent. for the white and 0.02 per cent. for the colored, when this cause or group of causes is one of such major importance in the examination of conscripts on the Continent. The statistics make it clear that they cannot be used for comparative purposes without extreme caution; in fact, it may be seriously questioned whether any comparison can at the present time be made which does not involve the serious risk of error in whatever conclusions may be arrived at. The analysis, there-

fore, suggests the urgency of radical reforms as regards both standardized methods of physical and medical examination in recruiting and the subsequent tabulation, classification and publication of the returns.

COMPARATIVE CAUSES OF REJECTION FOR MILITARY SERVICE

The questions involved in the practical use of army anthropometry and medical statistics are of such obvious vital importance, not only to the military authorities but to the public at large, that unnecessary delay in the required changes and improvements must be considered as contrary to public policy and the scientific spirit of the age. It is difficult to understand how so important a branch of statistics should have been so conspicuously neglected that not much more than a beginning has been made toward placing the army anthropometric and medical statistics upon a thoroughly well-developed scientific basis and above the serious criticism of inherent untrustworthiness and practical uselessness. Even the great work of Prof. Dr. H. Schwiening fails to meet modern requirements, due primarily to the inherent limitations of the data in consequence of the neglect on the part of the military authorities to properly develop the statistical branch of the army medical and recruiting services. The statistics for the various foreign countries utilized for the present purposes and chiefly derived from the work of Schwiening cannot, therefore, be accepted as conclusive evidence of the physical superiority or inferiority of the different army groups or of the same group at different periods of time. No two countries, apparently, follow the same methods of recruiting, of physical examination, the same rules and regulations in physical and medical rejections and, finally, the same classification and tabulation of returns. The status of the problem in this respect is much the same as some twenty years ago was true of general mortality statistics, the reform of which dates from the now almost universal adoption of the Bertillon or international classification of causes of death.

These limitations in army medical statistics explain the contradictory nature of many of the conclusions based upon crude and far-from-satisfactory returns. Thus, for illustration, it is frequently not entirely clear whether rejection ratios are derived from recruiting material subjected to a previous process of the elimination of the obviously unfit or from the entire material subject to conscription or selective draft. It is also often doubtful, especially as regards anthropometric statistics, whether the official data have reference to the recruiting material previously to medical selection or merely to accepted recruits, as was the case in the United States Army before the war. Now, of course, such a selected group cannot be considered typical of the normal

stature or weight distribution of the male population of military age, since those above the maximum and those below the minimum of the army standard are excluded. In no direction, however, are the statistics more inconclusive than in the assigned causes of rejection for military service, especially where the practice prevails of assigning all those who are generally deficient in physique, health or bodily strength to a relatively large group designated as "general debility." It is true that for Germany the details of this group are reasonably well understood, but it requires a thorough knowledge of the German army regulations to determine the significance of numerically unimportant but medically suggestive causes and conditions. Unquestionably, the difficulties to be overcome are often serious, as, for illustration, in the cases of retarded bodily development and deficiencies in consequence of the debilitating effects of previous illness, etc. In the absence of a thoroughly well-considered international classification of causes of rejection, the available statistical material requires therefore to be used with extreme caution.

In further illustration of these observations, it seems advisable to briefly restate the principal causes of rejection in recruiting as officially assigned in the army experience of representative countries, primarily for the purpose of emphasizing still more precisely the inherent limitations of army recruiting statistics in their medical aspects and the more or less inconclusive evidence of the prevailing physical or medical defects and deficiencies in the recruiting material of the armies of the different countries under review. Most of the following data are derived, as a matter of convenience, from the treatise on Military and Sanitary Statistics by Dr. H. Schwiening.

CAUSES OF REJECTION IN THE GERMAN ARMY

The first table is for the German army and the period 1904-08. In addition to the six principal causes of rejection, the table shows the percentage of such rejections *in the total number of recruits examined,* which must not be confused with the percentage distribution of all causes of rejection in the usual form, in which rejections only are considered and not with reference to the recruiting material from which they are derived.

PRINCIPAL CAUSES OF REJECTION IN THE GERMAN ARMY
1904-1908

		Per Cent. Examined
1.	General Debility	19.3
2.	Diseases of Heart and Circulation	3.0
3.	Minor Medical Defects (as defined by regulations)	3.0
4.	Defects and Deformities of the Extremities	2.9
5.	Flatfoot	2.1
6.	Hernia	2.1

According to this table, out of every 100 recruits examined in the German army, 19.3 were rejected for general debility, which includes retarded bodily development, weakness of the body as a whole or of any of its parts in consequence of previous illness or injury, and minor diseases or deformities not likely to result in permanent incapacity for military service. This group also includes deficient bone or muscular development, deficient chest development and lung capacity, etc. In the usage of other countries these defects or deficiencies are separately enumerated, and the proportion of such rejections in the German army considered as a group cannot, therefore, be compared or contrasted with the combined figures for other armies, on account of the absence of corresponding army rules and regulations governing with approximate precision the designation or classification, as the case may be. It, nevertheless, is extremely significant that the proportion of rejections for this group of causes and conditions should be so large in the German army regardless of universal physical training co-ordinated to military requirements.

CAUSES OF REJECTION IN THE AUSTRO-HUNGARIAN ARMY

The next table is for the Austro-Hungarian Empire, and for the decade 1894-1905. It is limited to the first three age groups of the attained minimum stature of 153 cm.

PRINCIPAL CAUSES OF REJECTION IN THE AUSTRO-HUNGARIAN ARMY, 1894-1905

		Per Cent. Examined
1.	General Bodily Weakness	43.0
2.	Varicose Veins	3.3
3.	Intestinal Displacement (Hernia)	3.1
4.	Goitre	2.8
5.	Flatfoot	2.4
6.	Deformities of Skeleton and Skull	2.2

The term "bodily weakness" as used in the Austrian statistics is obviously a large group of miscellaneous causes and conditions, each and every one of which should be separately stated to permit of a definite assignment in a strictly scientific classification. Such a group of causes or conditions serves no medical and military purpose, but merely tends to preclude finality of judgment and accuracy in comparison. It is also a practical certainty that such a grouping permits of the inclusion of a large number of ill-defined causes or conditions; but it justifies, in the main, the assumption that a very considerable proportion of those examined for service in the Austro-Hungarian army are of a sufficient degree of physical inferiority as to be unfit for the stress and strain of military life. It, however, must not be overlooked that in countries where the military age may begin with 18 in the case of volun-

teers, many of the recruits who may be physically underdeveloped at the time of examination may be assigned to a class subject to re-examination and may be acceptable for military service on attaining full maturity. The Austrian statistics illustrate precisely the urgency of a rational and well-considered international classification of causes and conditions of rejection, but in the absence of similarity in other recruiting requirements, such as the age and the method of selection, the derived classification itself may still remain inconclusive and possibly seriously misleading.

CAUSES OF REJECTION IN THE FRENCH ARMY

The following table is for the French army, for the period 1907-10:

PRINCIPAL CAUSES OF REJECTION IN THE FRENCH ARMY
1907-1910

		Per Cent. Examined
1.	Diseases of Bones and Extremities	2.4
2.	General Bodily Debility	1.9
3.	Tuberculosis	1.2
4.	Ill-defined and Not-designated	1.0
5.	Varicose Veins	0.9
6.	Errors of Refraction	0.8

The French statistics clearly emphasize the non-comparability of the data with those of Germany and Austria. For tuberculosis, which is returned separately for France, is probably included in general debility in the statistics of Germany and Austria, at least as a predisposing condition or with the disease in its initial stages. The German classification, in fact, does not specifically enumerate tuberculosis, but it gives a separate classification for diseases of the lungs (1.0 per cent.), asthma (0.04 per cent.) and diseases of the larynx (0.3 per cent.). These three groups, therefore, constitute a major group of diseases of the respiratory organs, probably inclusive of a fair proportion of cases of tuberculosis, at least in its initial stage. In contrast, it is exceedingly significant that the permanent rejections in the French army on account of tuberculosis should have been 1.2 per cent., as stated, with a reasonable assumption that cases in the initial stages of the disease were also included in the second group under bodily weakness or general debility. The term "tuberculosis" as used in the foregoing group is, however, exclusive of tuberculosis of other organs or parts, the proportion of rejections on account of which was 0.4 per cent. It is intimated by Schwiening that the rate of discharges on account of tuberculosis in the French army previously to the war was relatively high, and that therefore the examinations in connection with recruiting were either in many cases superficial or conditions of army life were peculiarly predisposing to the development of the disease soon after entry into the military service.

The French statistics also illustrate clearly the importance of exceptional causes in their effects upon general recruiting results. Thus, for illustration, in the Austrian experience, goitre is the fourth important cause, accounting for 2.8 per cent., but in the French army this condition accounts for only 0.14 per cent. Equally important are the differences in rejections for flatfoot. In the German army this condition accounts for 2.1 per cent. of the examined, in the Austrian for 2.4 per cent., but in the French army for only 0.34 per cent.

CAUSES OF REJECTION IN THE SWISS ARMY

The Swiss recruiting statistics are for the period 1901-05, and their results by causes are also on the percentage basis of the examined. The statistics are even more conclusive than those of Germany and Austria, for the purpose of illustrating the importance of exceptional causes or specific conditions, such as goitre, hernia, etc.

PRINCIPAL CAUSES OF REJECTION IN THE SWISS ARMY, 1901-1905

		Per Cent. Examined
1.	Goitre	6.1
2.	Visual Defects and Errors of Refraction	5.6
3.	Flatfoot	4.1
4.	Below Minimum Stature	3.7
5.	General Bodily Weakness	3.3
6.	Hernia	2.7

Next to goitre errors of refraction are apparently the principal cause of military unfitness in the Swiss army. There is probably no condition which gives rise to more confusion and error than the examination of the eyes. In some recruiting statistics all visual defects, errors of refraction, as well as eye diseases and even blindness, are combined. This, however, is not the case in Switzerland, where other diseases of the eyes account for 1.7 per cent. of the examined, and blindness of one or both eyes for 0.02 per cent.

The rejections for failure to attain to the minimum stature in Switzerland are of exceptional importance. They clearly emphasize the effect of governing rules and regulations rather than of physical inferiority, on the one hand, and the actual army necessities on a peace basis, on the other. In the German army the proportion rejected on account of failure to attain to the minimum stature was only 0.08 per cent., against 3.7 for the Swiss army. Evidently either the Swiss requirements as to stature are unnecessarily rigorous or unduly high in consequence of the sufficiency of recruiting material to maintain the recruiting strength of the army on a peace basis.

CAUSES OF REJECTION IN THE ITALIAN ARMY

The following table for Italy is for the period 1905-09:

PRINCIPAL CAUSES OF REJECTION IN THE ITALIAN ARMY
1905-1909

		Per Cent. Examined
1.	General Weakness	5.1
2.	Deficient Development of Chest	4.1
3.	Diseases of the Eye, including Errors of Refraction	2.1
4.	Scrofula, Anemia, Weakness, etc	2.0
5.	Diseases of Bones, Extremities, etc	1.9
6.	Hernia	1.5

In Italy, Austria and Germany general bodily weakness is the predominating cause of army rejections. For medical and recruiting purposes this term is neither conclusive nor practically useful. Combining general bodily weakness with deficient chest development and scrofula, anemia, convalescence, etc., the three causes account for 11.2 per cent. of the rejections of the examined in the Italian experience, against 19.3 per cent. in the German army and 43.0 per cent. in the Austrian army. It is exceedingly doubtful whether on the basis of a thorough medical examination, with a due regard to the necessity for the ascertainment of *all* existing impairments, defects and deficiencies and not merely the predominating one sufficient for military disqualification, the Italian recruits would still hold a position of superiority in physical development over the recruits of the German or the Austrian Empire.

CAUSES OF REJECTION IN THE BELGIAN ARMY

The Belgian statistics are for the period 1902-04.

PRINCIPAL CAUSES OF REJECTION IN THE BELGIAN ARMY
1902-1904

		Per Cent. Examined
1.	Bodily Weakness	8.0
2.	Diseases of the Bones and Extremities	5.0
3.	Diseases of Eyes, including Blindness and Ophthalmia	4.4
4.	Below Minimum Stature	2.3
5.	Varicose Veins	1.9
6.	Hernia	1.6

In all of the recruiting statistics specific rejections for tuberculosis hold a comparatively unimportant position. In the Belgian army the rejection rate was only 0.15 per cent., but in addition thereto the rejections for diseases of the respiratory organs were 0.8 per cent. The fact, of course, must not be overlooked that the examinations concern almost exclusively the recruiting material between 20 and 22 years of age, at which tuberculosis has rarely developed to a point of sufficient seriousness to permit of its ascertainment except by thorough methods

of examination. In proportion, therefore, as methods of physical and medical examination are perfected, the rejection ratio is increased, but the higher percentage is merely evidence of thoroughness and not necessarily of a higher degree of frequency occurrence.

CAUSES OF REJECTION IN THE DUTCH ARMY

The statistics for Holland are for the period 1903-07.

PRINCIPAL CAUSES OF REJECTION IN THE DUTCH ARMY, 1903-1907

		Per Cent. Examined
1.	Errors of Refraction	4.2
2.	Other Diseases of the Eyes	1.9
3.	Bodily Weakness, Anemia, etc	1.9
4.	Flatfoot, etc.	1.6
5.	Spinal Curvature, etc	1.5
6.	Ear Diseases	1.0

The predominating importance of visual impairments, accounting for rejections of 6.1 per cent. of all the examined and 32.5 per cent. of all rejections, is not explained by the available information as regards the military rules and regulations covering army rejections on this ground. It is difficult to assume that visual defects are proportionately so very much more common in Holland than in Germany, and the high-frequency figure is probably governed exclusively by rules and regulations, for in Germany, where errors of refraction are known to be exceptionally common, and perhaps more so than in any other country, the proportion of rejections for this cause was only 2.0 per cent., and, including blindness and all other diseases of the eye, only 3.1 per cent.

Of special importance in the Dutch recruiting statistics is the relatively high rate of rejections on account of flatfoot and related pathological conditions of the feet. No details are provided, but in the Belgian statistics flatfoot accounts for rejections of 0.27 per cent. of the examined, while other pathological conditions of the feet, such as excessive sweating, etc., account for 0.7 per cent.

Finally, the very high figure for rejections on account of spinal curvature, etc., in the Dutch army indicates rather exceptional thoroughness in the examinations and particular attention to a condition probably frequently overlooked or ignored in other countries. In the German army experience rejections on account of spinal curvature represent only 0.3 per cent. of the examined, against 1.5 per cent. in the Dutch army. The condition is not enumerated at all in the Belgian statistics, but in French recruiting the proportion of those rejected on this account was 0.46 per cent.

CAUSES OF REJECTION IN THE SWEDISH ARMY

The statistics for Sweden are for the period 1903-07, differentiating those of the age period 21 and those of older ages. As might be

expected, the two groups yield somewhat different results, and as illustrating the importance of the age factor, which is almost invariably ignored in recruiting and army medical statistics, the rejection results are presented for both groups, and in the first group (age 21) in the order of their importance.

PRINCIPAL CAUSES OF REJECTION IN THE SWEDISH ARMY
1903-1907

	Per Cent. Examined Age 21	Over 21
1. Diseases of the Heart and Circulatory Organs	4.4	5.7
2. Diseases of Bones and Extremities	3.4	3.6
3. Deafness and Other Diseases of the Ears	1.6	1.1
4. Tuberculosis	1.6	2.9
5. Constitutional Weakness	1.5	4.5
6. Diseases of the Eyes	1.4	1.3

The Swedish statistics are of very limited practical value on account of the grouping of the causes, as best illustrated by the predominating importance of rejections on account of diseases of the heart and circulatory organs. Rejections for heart impairments require differentiation as to whether functional or organic. Methods of examination vary widely in the different armies and according to the branch of the service. In modern armies with a thoroughly developed aviation service the rejections for even minor functional heart murmurs are of course very high. A man may be rejected for the aviation service although thoroughly sound and efficient for some other branch of army work. To group all rejections for diseases of the heart and circulatory organs with mere functional defects or deficiencies is therefore scientifically erroneous. In the German army rejections on account of diseases of the heart and circulatory organs accounted for 3.0 per cent. There are no corresponding data for the Austrian army, for which the information is limited to rejections on account of valvular heart disease alone, accounting for 0.24 per cent. of the examined.

Equally suggestive in the Swedish statistics is the rather high ratio of rejections on account of deafness and other diseases of the ear (1.6 per cent.). It is scientifically erroneous to combine defects of hearing with ear diseases and congenital deafness. It is even more misleading to combine deafness and mutism in one classification, as is the case in the German statistics, which, however, return defects of speech separately. The German statistics also return separately diseases of the ear, accounting for rejections of 1.5 per cent. of the examined, in addition, however, mutism and deaf-mutism combined, accounting for 0.09 per cent. It would seem, therefore, that deafness and other diseases of the ear are not necessarily exceptionally common as a cause of rejection in the Swedish army, especially when compared with the ratio for Norway of 2.5 per cent.

CAUSES OF REJECTION IN THE NORWEGIAN ARMY

The statistics for Norway are for the period 1904-08, on the basis of the examined, but they are unfortunately not available in sufficient detail to make even an approximately useful comparison possible with the corresponding statistics for Sweden. The causes of rejection are given as follows: Diseases of the extremities, 7.1 per cent., diseases of the eyes, 4.4 per cent., diseases of the lungs, 2.6 per cent., diseases of the ears, 2.5 per cent., diseases of the heart, 2.3 per cent., and hernia, 2.2 per cent. The statistics for both Norway and Sweden seem to indicate a decidedly lesser proportion of rejections for bodily weakness, anemia, scrofula, etc., than met with in the recruiting experience of Germany, Austro-Hungary and Italy.

CAUSES OF REJECTION IN THE BRITISH ARMY

How far the foregoing statistics of causes of rejection in recruiting under a system of compulsory military service can be compared with the corresponding statistics of England and of the United States under a condition of voluntary military service previous to the war is, of course, an open question. The great work by Schwiening reflects such a degree of thoroughness and accuracy that it has seemed best for the present purposes to utilize the returns included by him for England and for the United States in the two following tables, rather than to recompute the available official statistics, which at best would result in only minor changes, due to differences in classification, etc. For England the statistics are for the period 1906-10, on the basis of the examined, differentiating, however, those rejected outright on first examination and those rejected within three months after conditional acceptance. The latter figures, for the present purpose, are of minor importance and are therefore omitted.

PRINCIPAL CAUSES OF REJECTION IN THE BRITISH ARMY
1906-1910

		Per Cent. Examined
1.	Deficient Chest Measure	5.3
2.	Dental Defects and Deficiencies	5.2
3.	Visual Defects	2.8
4.	Diseases of the Heart	2.8
5.	Defects of Lower Extremities	1.7
6.	Varicose Veins	1.4
7.	Diseases of Veins	1.2
8.	Below Minimum Stature	1.2
9.	Below Minimum Weight	1.2
10.	Flatfoot	0.9

On account of their practical importance four additional principal causes have been included in the preceding table. It is self-evident that the results cannot be strictly compared with corresponding statistics concerning rejections in connection with military service on a

conscription basis. The high proportion of rejections in the British army on account of deficient chest measurement is obviously in consequence of a military rule not necessarily governed by necessity or sound anthropometric considerations. The same conclusion applies to defects and deficiencies in dental development, as best made evident by the radical change in the rules governing this matter in the examinations of the United States Army under the Second Selective Draft compared or contrasted with the methods under the First Selective Draft. The English statistics are rather evidence of over-refinement in rules and regulations than of physical inferiority or military unfitness of the recruiting material. This conclusion applies particularly to the relatively high proportion of rejections on account of dental and visual defects, minimum stature and minimum weight.

CAUSES OF REJECTION IN THE UNITED STATES ARMY

The statistics for the United States are for the period 1906-10, with a differentiation of the white and the colored. The ten principal causes of rejection are arranged in the order of their importance for the white recruits.

PRINCIPAL CAUSES OF REJECTION IN THE UNITED STATES ARMY WHITE AND COLORED, 1906-1910

		Per Cent. Examined	
		White	Colored
1.	Diseases of the Eyes, and Errors of Refraction	1.6	0.8
2.	Venereal Diseases	1.2	1.9
3.	Diseases of Ears, including Defects in Hearing	1.1	0.3
4.	Diseases of Heart	1.0	0.9
5.	Underweight	0.8	0.4
6.	Defective Dentition	0.7	0.4
7.	Alcoholism	0.7	0.3
8.	Flatfoot	0.6	0.7
9.	Hernia	0.5	0.5
10.	Insufficient Chest Development	0.4	0.2

These results for the United States are so very much at variance with the corresponding data for foreign countries that the main cause of the differences must be attributable to methods of selection under the voluntary system. The three principal causes of rejection are of relatively minor military importance, as best made evident by the profound changes in examination methods under the Second Selective Draft. Diseases of the heart, which account for about 1 per cent. of the examined, cannot be considered relatively important when contrasted with a rejection ratio of 3 per cent. in the German army. Underweight is largely governed by arbitrary standards and not necessarily of pathological significance. The relatively high ratio of rejections on account of defective dentition is largely the result of rules and regulations, which under the Second Selective Draft have been very materially modified. The same conclusion applies to alcoholism and to

a somewhat lesser degree to flatfoot and hernia. The rejection ratio on account of insufficient chest development, which is numerically of the first importance in the British experience, is relatively unimportant in the American experience, or only 0.4 per cent. of the examined, against 5.3 per cent. for the British army previously to the war. *

For the colored the rejection ratios are quite different, the most pronounced variation being in the lesser degree of frequency of diseases of the eye and errors of refraction, and the much higher degree of frequency of venereal diseases. There is also, however, a very marked difference in the lower rejection ratio for the colored on account of diseases of the ear and defects of hearing, as well as defective dentition, underweight, alcoholism and insufficient chest development. The difference in the rejection on account of flatfoot is not as marked as generally assumed to be the case, the respective ratios being 0.6 per cent. for the white recruits and 0.7 per cent. for the colored.

These results are somewhat modified by more recent statistics for the period 1910-15, inclusive of the entire United States Army and native recruits in the Philippines and Porto Rico. A rather serious practical difficulty is the relatively large proportion of rejections on account of causes not physical or medical, chiefly rejections based on army rules and regulations not bearing directly upon the physical fitness of the examined recruit for military service. For the white and the colored recruits combined the six principal causes of rejection during the period under review were as follows:

UNITED STATES ARMY REJECTION EXPERIENCE, 1910-1915
WHITE AND COLORED

	Per Cent. Examined
1. Causes not Physical	2.19
2. Venereal Diseases	1.23
3. Heart Diseases	1.03
4. Ear Diseases and Defective Hearing	0.94
5. Eye Diseases and Defects of Vision	0.80
6. Flatfoot	0.59

CAUSES OF REJECTION—WHITE RECRUITS ONLY

Considering separately white recruits only, the results were as follows:

UNITED STATES ARMY REJECTION EXPERIENCE, 1910-1915
WHITE RECRUITS ONLY

	Per Cent. Examined
1. Causes not Physical	2.20
2. Venereal Diseases	1.11
3. Heart Diseases	1.04
4. Ear Diseases and Defective Hearing	0.97
5. Eye Diseases and Defects of Vision	0.82
6. Flatfoot	0.60

* From this table, derived as stated from German sources, the rejections in the United States Army for "causes not physical" are omitted. This group of causes, however, has been included in the tables following, so as to facilitate a more accurate comparison with the corresponding statistics for foreign armies.

The important fact disclosed by this analysis is the relatively low proportion of rejections for venereal diseases, with regard to which the examination and rules concerning exclusion in the United States Army are in all probability much more strict, being even drastic, than those in use in the armies of continental Europe. As might be expected, the rejection rate for venereal disease among the colored recruits was perceptibly higher, as shown by the table following:

CAUSES OF REJECTION—COLORED RECRUITS ONLY

UNITED STATES ARMY REJECTION EXPERIENCE, 1910-1915
COLORED RECRUITS ONLY

		Per Cent. Examined
1.	Venereal Diseases	2.86
2.	Causes not Physical	2.00
3.	Ear Diseases and Defective Hearing	0.90
4.	Eye Diseases and Defects of Vision	0.52
5.	Flatfoot	0.49
6.	Hernia	0.43

It is rather surprising to find a relatively low rate of rejections on account of flatfoot among the colored, or 0.49 per cent. of the examined, against 0.60 per cent. for the white recruits. In the earlier data of Schwiening for the period 1906-10 the rejections on account of flatfoot among the white recruits were 0.57 per cent. of the examined, against 0.70 for the colored. The relative frequency of flatfoot among the colored is in all probability not as pronounced as often assumed to be the case upon superficial inquiry into the facts. As a general principle, however, it is probably safe to assume that flatfoot is more common among colored males than among white males of corresponding age.*

CAUSES OF REJECTION—NATIVE AND FOREIGN-BORN RECRUITS

A comparison of native-born recruits with those of foreign birth in the United States Army is more or less misleading, on account of material variations in the age distribution of the examined. The foreign-born, as a general rule, are older and in many cases have had previous military experience in foreign countries. As an illustration, however, of the marked difference in the health and physique of the examined recruiting material, the two following tables show the six principal causes of rejection in the United States Army experience for the native and foreign-born white applicants for military service.

* A thoroughly scientific discussion of "The Soldier's Foot as an Important Feature of an Effective Army," originally contributed to *American Medicine* by Harold D. Corbusier, M. D., Major, Medical Officers' Reserve, United States Army, has been reprinted in the *Scientific American Supplement,* No. 2172, for August 18, 1917. This discussion includes in its subdivision, first, the exceptional foot; second, the doubtful foot; and, third, the disqualified foot, with observations on special pathological conditions and remedial considerations.

UNITED STATES ARMY REJECTION EXPERIENCE, 1910-1915 NATIVE WHITES

		Per Cent. Examined
1.	Causes not Physical	1.86
2.	Venereal Diseases	1.19
3.	Heart Diseases	1.06
4.	Ear Diseases and Defective Hearing	0.96
5.	Eye Diseases and Defects of Vision	0.83
6.	Flatfoot	0.58

UNITED STATES ARMY REJECTION EXPERIENCE, 1910-1915 FOREIGN-BORN WHITES

		Per Cent. Examined
1.	Causes not Physical	4.08
2.	Ear Diseases and Defective Hearing	1.05
3.	Heart Diseases	0.91
4.	Eye Diseases and Defects of Vision	0.77
5.	Venereal Diseases	0.75
6.	Flatfoot	0.71

The most important difference met with is the decidedly higher ratio of rejections among the foreign-born on account of causes not physical, which in all probability are closely related to age and previous military experience. The age factor also probably explains the lower ratio among the foreign-born of rejections on account of venereal diseases, while conversely the possibility of previous military experience has a bearing upon the somewhat higher rejection ratio for flatfoot.

CAUSES OF REJECTION—FILIPINO AND PORTO RICAN RECRUITS

Of exceptional interest are the rejection statistics of native Filipinos and native Porto Ricans, limited, however, for the present purpose to the period 1912-15. Prior to 1912 only causes responsible for more than one rejection per annum were reported, so that a consolidation of the statistics for the earlier period would be misleading.

UNITED STATES ARMY REJECTION EXPERIENCE, 1912-1915 FILIPINOS

		Per Cent. Examined
1.	Eye Diseases and Defects of Vision	0.85
2.	Heart Diseases	0.78
3.	Tuberculosis	0.72
4.	Causes not Physical	0.66
5.	Underweight	0.57
6.	Ear Diseases and Defective Hearing	0.41

UNITED STATES ARMY REJECTION EXPERIENCE, 1912-1915
PORTO RICANS

		Per Cent. Examined
1.	Underweight	4.73
2.	Insufficient Chest Development	1.40
3.	Eye Diseases and Defects of Vision	1.22
4.	Defective Development	1.13
5.	Venereal Diseases	1.05
6.	Flatfoot	0.96

Limited in numbers, as these statistics are, for the Filipino and the Porto Rican recruits, they are nevertheless of exceptional value in emphasizing the probability that the anthropometric standards applied to this class of applicants were those used generally for the Army of the Continental United States, though for racial and other reasons quite inapplicable in view of material variations in physique. The results leave no question of doubt as to the fact that many Filipino and Porto Rican recruits were unnecessarily rejected because of non-conformity to anthropometric standards based upon a heterogeneous mass of recruiting material of totally different racial origins. It requires to be kept in mind, of course, that undernourishment is probably more common among Porto Ricans and Filipinos than among white and colored recruits of the mainland of the United States, and that particularly in the case of the Porto Ricans, the former excessive frequency of anemia and of uncinariasis have a direct bearing upon the relatively exceptionally high rejection ratio for underweight. *

The entire recruiting material is suggestive of the need of decidedly more qualified consideration of questions of normal physique and abnormal departures from rational standards of physical development and bodily proportions, if serious errors are to be avoided, both in the direction of accepting recruits really unfit for military service in the field and in the direction of rejecting men thoroughly qualified, except in possibly minor details, for service demanding even the extraordinary stress and strain of modern warfare on land and sea.

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* The results of Some Anthropometric Measurements of Students of the University of Porto Rico, by Fred K. Fleagle, Dean of the College of Liberal Arts, have been published in the Bulletin of the University of Porto Rico under date of January, 1917. The measurements include 1,412 students, of whom 616 were males of an average age of 19.59 years. The measurements are of special value in that they are for single years and for three successive dates, including twenty separate anatomical factors aside from height and weight. An interesting comparison is made with the corresponding measurements of Chilean boys by single years of life, 16-20, inclusive.

With special reference to Filipinos, see the Racial Anatomy of the Philippine Islanders, by R. B. Bean, published by J. B. Lippincott & Company, Philadelphia, 1910.

The physical standards applicable chiefly to the native-born are more or less inapplicable to Orientals. See in this connection some recent statistics on the height, weight and chest measurements of healthy Chinese in the China *Medical Journal*, for May, 1918. See, also, the tables on the Average Physical Condition of the applicants examined for admission to the Imperial Japanese Navy, Annual Report, 1909-11, Tokio.

PART II

RECENT UNITED STATES ARMY MEDICAL AND REJECTION EXPERIENCE DATA

In its theoretical as well as practical aspects the whole problem of army anthropology has undergone important and far-reaching changes in consequence of the war. A method of selection for military service during a prolonged period of peace must necessarily vary considerably from the method of selection of men for active service in the field, but much more so when the exhausting effects of a great war upon the manpower of a nation demand a lesser degree of rigid conformity to theoretical principles of physical fitness for military duty. The experience which has now been had in the United States with the First Draft under the Selective Service Act of 1917 is obviously, for our own purposes, at least, of over-shadowing importance. An extended and admirable report has been made public by the Provost-Marshal General, which, however, still leaves many important questions undecided. The vast extent of our draft experience at this time practically precludes a qualified statistical analysis of the data, however important the results would be for the needs of anthropological and medical science. Unfortunately, many erroneous conclusions have been advanced upon the basis of the experience which has thus far been had, with the result that many far-reaching misleading arguments are being advanced and left uncontradicted by an appeal to a statement of the facts. It, for illustration, has been alleged that "War tests show that the nation is in feeble health," and that "Ninety-nine per cent. are below par." No evidence of a sufficiently trustworthy nature has, however, been forthcoming from the Provost-Marshal General's office to substantiate these conclusions, nor in support of the further exaggeration that "The exact status of Americans' physical condition is disclosed by countrywide examinations of applicants for service, and the verdict is all but alarming." As a matter of fact, the only analysis of the causes of physical rejection which has thus far been made by the Provost-Marshal General's office concerns 10,258 recruits out of a total of 3,082,949 men called for examination and hearing, of which 730,756 were examined and rejected on physical grounds, or 23.7 per cent. Eliminating those who were merely given a hearing, it appears that 2,510,706 men were

physically examined by the Boards and, it is to be assumed in each and every case, by a qualified medical examiner, and that of this number 730,756, or 29.11 per cent., were rejected. These rejections, however, were only in the first instance by Local Boards. Subsequently, of 561,000 men examined by Boards of Appeal, of which number 413,384 had arrived in camp by November 20, the number rejected by camp surgeons, and it may be assumed on the basis of a more rigid examination made under more satisfactory conditions, was 22,989, or 5.8 per cent. If it is therefore assumed that this percentage would apply to the entire 730,756 men rejected for so-called "physical" reasons by Local Boards, it would appear that 34.91 per cent. of the men physically examined by the Boards were considered totally unfit for active military service.

DISCRETIONARY POWERS IN PHYSICAL EXAMINATIONS

In the words of the Provost-Marshal General, "Doubtless the Local Boards varied extremely in the strictness of their examinations. But so also, it seems, did the camp surgeons." The experience shows "that the percentage of rejections at camp varied between 0.72 per cent. and 11.87 per cent.; and as the physical condition of the men from the different regions cannot entirely account for this, it must be attributable in part to differences of strictness in the examinations by the camp surgeons." As to the important question whether the Surgeon General's rules for physical examination, as set forth in the directions to the Local Boards, were stricter than necessary for securing efficient fighting men, it is said that on this point "the civilian surgeons have expressed variant opinions," and a large majority "consider that the physical requirements are not too exacting," but "a considerable number deem the requirements too strict in many respects, notably as to the weight and height relation, teeth, eyes and feet, and contend that the regulations as strictly applied tend to exclude many capable and efficient men." If a tendency towards over-emphasis upon relatively unimportant physical or other factors concerning health and physique was at all pronounced in connection with the original examinations by the civilian surgeons of the Boards and subsequently by the army surgeons at the camps, it is self-evident that a fairly large proportion of men must have been rejected on so-called "physical grounds," although quite probably of normal physique and average power of endurance as determined by standards such as would govern in the acceptance of risks for life insurance. It is therefore most regrettable that an analysis should only have been made of the causes of rejection of 10,258 recruits at eight different camps, which would indicate that the rejections were by army surgeons and not by civilian medical examiners in connection with the examinations made under the direction of the Boards. The latter, unquestionably, are more

lenient than the former, and probably subject to an even larger degree of variation than the indicated range from 0.72 per cent. for Camp Riley to 11.87 per cent. for Camp Deven. The table following has been rearranged so as to show the causes for physical rejection and their percentage distribution in the order of their importance as given in the Provost-Marshal General's report made to the Secretary of War under date of December 20, 1917.

CAUSES FOR PHYSICAL REJECTION BY CAMP SURGEONS—NATIONAL ARMY EXPERIENCE UNDER FIRST DRAFT OF THE SELECTIVE SERVICE ACT OF 1917

Causes for Physical Rejection	Number	Per Cent.
Eye	2,224	21.68
Teeth	871	8.50
Hernia	766	7.47
Ear	609	5.94
Heart Diseases	602	5.87
Tuberculosis	551	5.37
Mentally Deficient	465	4.53
Genito-urinary (Venereal)	438	4.27
Physical Undevelopment	416	4.06
Nervous Disorders (General and Local)	387	3.77
Flatfoot	375	3.65
Joints	346	3.37
Bones	304	2.96
Blood Vessels	191	1.86
Underweight	163	1.59
Respiratory	161	1.56
Genito-urinary (Non-venereal)	142	1.39
Skin	118	1.15
Ill-defined or Not-specified	93	.91
Digestive System	82	.80
Alcoholism and Drug Habit	79	.77
Muscles	66	.64
Not stated	809	7.89
Total number of cases of physical rejections considered	10,258	100.00

NEGATIVE EVIDENCE OF PHYSICAL DETERIORATION

This table is of exceptional importance. It fails in every way to sustain the conclusion so frequently advanced by sensational writers that the medical examinations under the First Selective Draft have brought to light a truly astonishing amount of physical impairment and military inefficiency on the part of the men of the draft-age period, 21 to 30, inclusive. The table shows that 21.68 per cent. of the rejections were for diseases of the eye, followed by a proportion of 8.5 per cent. of the rejections for defective teeth. Since defects of

hearing accounted for 5.94 per cent. of the total rejections, it appears that 36.12 per cent. of all the rejections were due to defects or deficiencies of the eye, the ear and the teeth. How far these defects are remediable is, of course, an important question, but certainly no alarming assertions are justified regarding national physical deterioration as disclosed by this very limited basis of exact information for a relatively small proportion of the men examined under the Selective Service Draft.

A further examination of the details, in fact, affords much ground for satisfaction and evidence that the physical condition of the young men examined was indeed in many respects a remarkably satisfactory one. Out of 10,258 men only 79, or 0.77 per cent., were rejected on account of alcoholism and drug habits. The proportion rejected for venereal diseases was 4.27, which is high, but not excessive. Physical underdevelopment accounted for 4.06 per cent. of the total rejections, aside from 1.59 per cent. for underweight. More important are the rejections for tuberculosis, or 5.37 per cent. of the total, and for non-tuberculous respiratory diseases, or 1.56 per cent. Heart diseases are represented by 5.87 per cent. and nervous disorders, general and local, by 3.77 per cent., aside from 4.53 per cent. for mental deficiency. There is nothing alarming in these figures, which, of course, require to be used for practical purposes with extreme caution. Erroneous conclusions might easily be drawn from the fact, for illustration, that rejections for hernia are represented by 7.47 per cent. of the total; but under the new rules and regulations of the Provost-Marshal General's office the ratio of rejections on this account will be very much reduced. The same conclusion applies to flatfoot, which accounts for a rejection proportion of 3.65 per cent., but which under the revised rules will be reduced to a much smaller proportion.

In other words, it is largely a question of rules and regulations rather than of physical facts and conditions. The very term "physical rejections" as used in the Provost-Marshal General's report is a rather misleading one, since there are included a considerable proportion of causes which are not physical in a strict sense, but pathological, or so ill-defined or not specified as not to permit of being classified or precisely stated.

IMPORTANT CHANGES IN RULES AND REGULATIONS

The original rules and regulations governing the physical examination of recruits or conscripts under the Selective Service Law were promulgated by the Secretary of War under date of November 8, 1917. These rules have been materially modified by the revised regulations of the office of the Provost-Marshal General, made public under date of January 28, 1918. The modifications have practically all been decidedly in the direction of a lesser degree of exact conformity to

theoretical principles and a more rational adaptation to practical service requirements, and if they had been applied in the original examinations and rejections under the First Draft, the proportion of rejections would unquestionably have been substantially reduced. The general assumption of a single rule of action as to fitness for military service has, fortunately, been radically changed, and hereafter the men accepted will be classified into four groups, as follows:

(A) Acceptable for general military service; (B) acceptable for general military service after being cured of remediable defect; (C) acceptable for special or limited military service in a specified capacity or occupation; (D) rejected and exempted from any military service.

Under this plan of reclassification according to physical condition, in a restricted sense of the term, provision will be made for the military utilization of a much larger proportion of conscripts or recruits than has heretofore been possible. It is stated to be the intention of the Provost-Marshal General to provide later for further investigation and reclassification of men acceptable for limited or special service, so that each and every one may be assigned to the kind of work least likely to endanger his health.

EXAMINATIONS BY OFFICERS OF THE LINE

The possibilities of a material saving in effective man-power by means of more careful and rational methods of physical selection are clearly emphasized by the table following, which has been derived from the annual reports of the Adjutant General for the five-year period 1913-17:

RECRUITING STATISTICS OF THE UNITED STATES ARMY
ADJUTANT GENERAL'S REPORTS
1913-1917

ENLISTMENTS AT RECRUITING STATIONS

Fiscal Year	Total Number of Applicants	Number of Applicants Rejected	Per Cent.	Number of Applicants Accepted	Per Cent.	Accepted and Later Rejected at Army Posts
1913	123,664	98,927	80.0	24,737	20.0	3,469
1914	168,527	127,317	75.5	41,210	24.5	5,308
1915	168,842	123,731	73.3	45,111	26.7	5,866
1916	133,090	102,097	76.7	30,993	23.3	4,194
1917	367,579	187,388	51.0	180,191	49.0	17,256
Total	961,702	639,460	66.5	322,242	33.5	36,093

According to this table, out of 961,702 applicants for military service, 639,460, or 66.5 per cent., were rejected. All of these rejections were, as far as known, on the basis of examinations made by non-medical officers of the line. The rejection ratio, however, varied from 80 per cent. in 1913 to 51.0 per cent. during 1917. The very substantial

reduction in the rejection rate during 1917 was naturally in consequence of a lesser degree of severity in the initial examinations by non-medical officers of the line. It is the practice, however, to re-examine the recruits at recruiting depots and depot posts, chiefly, it is understood, by medical officers of the Army. Out of 337,599 men thus subjected to re-examination during the period 1913-17, the number rejected was 37,938, or 11.2 per cent. No statistics are available to show what proportion of rejected applicants would have been acceptable to the army authorities if re-examined by army medical officers in conformity to the same method which prevails in the case of the re-examination of accepted applicants. The medical rejection ratio of the re-examined was 13 per cent. in 1913, 11.6 per cent. in 1914, 11.5 per cent. in 1915, 14.1 per cent. in 1916, but only 10.3 per cent. in 1917. The lower medical rejection rate in 1917 may therefore be accepted as evidence that the rejections in a measure were affected by the necessities of the war. The new method of examination and re-examination will probably continue for the duration of the war. The new instructions to examiners are based in a large measure upon the practical experience which has been had under the First Selective Draft.

EXAMINATIONS BY CIVIL MEDICAL OFFICERS OF LOCAL BOARDS

Among the numerous contributions which have been made to the literature of the subject by medical experts of national reputation, a discussion on "The Examination of Registrants," by M. L. Harris, M. D., Medical Member of the District Appeal Board, Chicago, is of exceptional importance. According to Dr. Harris,

> When the first draft started, it was entirely a new experience to the people of this country. The rules and regulations were so drawn as to place the carrying out of the provisions of the act in the hands of the people; in fact, the act itself forbade any one connected with the military establishment to have anything to do with the execution of the draft. The personnel of the boards, local and district, was made up of civilians, both lay and professional, none of whom had had any experience in the selection of men for the Army. Practically all of the members of the boards labored under the disadvantage of having no opportunity to acquaint themselves with the work to be done until they were appointed to the positions and ordered to proceed at once with the draft. It is no wonder, then, that things did not go at all times as smoothly as they should have gone; it is no wonder that there were differences of opinion and even a lack of harmony between the various boards, which a better understanding of the work to be done would have avoided.

These observations apply with special force to the question of height, weight and chest expansion. Even though in the large majority of cases the results were quite satisfactory, as observed by Dr. Harris, it requires to be thoroughly understood "that the question which the physician is to determine when a person presents himself for examination is not what ailment, if any, he may have, but whether he is fit

or unfit to do military service." For, he continues, "These are not necessarily synonymous, for there are certain ailments which a person may have and still be fit for military service; and, on the other hand, he may be unfit for service without there being any special physical disability." It is self-evident that it must often be a most difficult matter to decide whether or not a certain condition really unfits one for service, and it is therefore particularly significant, as pointed out by Dr. Harris, "that the rules and regulations are not definite and clear on the subject," and that "therefore much is necessarily left to the judgment of the examining physician." These conclusions were arrived at, however, before the new rules and regulations of the Provost-Marshal General's office were made public. In answer to the important question whether the rejection statistics are really conclusive as regards the physical condition of the registrants or merely a statistical enumeration of the principal causes of rejection on the ground of unfitness for military service, Dr. Harris, on the basis of his own experience, states (*Journal American Medical Association,* January 19, 1918) that

> When the registrant alleged more than one ailment, which was very common, he was examined first for the most important one from a disqualifying sense. For instance, one might complain of bad eyes, trouble with his stomach, and rheumatism. The eyes would be examined first, and if the vision was found to be so defective as positively to disqualify the man, no time was spent in investigating his other complaints. It should be understood that the purpose of the examination is to determine the fitness or unfitness of the registrant for military service, not to make a complete clinical diagnosis such as one would do in practice. Hence, just as soon as a condition is found which under the rules and regulations positively disqualifies the man for military service, the examination need not be further extended. This, of course, applies to examinations on appeal, as it is necessary in all cases for the local board to make a complete examination and fill out a blank form as required by the rules and regulations.

It would appear from this statement that a complete examination of the registrant is made by the Local Board, but that only a single question, as a rule, receives consideration with the Board of Appeal. If this conclusion is entirely correct, the value of the rejection statistics by causes would be materially enhanced. Unfortunately, it is said that under the First Draft, at least, "The rules laid down for the guidance of physicians are quite incomplete and often ambiguous, so that much was left to the unaided judgment of the examiner," since many had "perhaps little or no experience in selecting men for the army, errors in judgment are not uncommon." The greatest number of errors, according to Dr. Harris, was made in the examination of the eyes. Since, according to the Provost-Marshal General's analysis, visual defects accounted for 21.68 per cent. of all the rejections for physical reasons, this element of error assumes special significance. In contrast, however, overlooked cases of pulmonary tuberculosis were ascertained on appeal, even though some of the applicants "had been

for some time inmates of the Municipal Tuberculosis Sanatorium of the city of Chicago." There were some cases of deficiency in height or weight, or both combined. Dr. Harris observes in this connection that "As the regulations prescribe 61 inches as the minimum height, and as our instructions were to make no concessions below 61 inches, of course all who fell below that height had to be rejected." "In the matter of weight, however," he remarks, "more discretion is allowed when the individual is otherwise in good physical condition." He makes reference to one rejection on account of underweight where the actual weight was 110½ pounds at the time of the examination, whereas the prescribed minimum for applicant's weight was 112 pounds. His chest measure was 1½ inches in excess of the measurement required according to his height, and he was otherwise physically sound. This applicant had tried in every possible way to procure exemption, and the conclusion was that "he deliberately reduced his weight, as his general condition was very good." Evidently cases of this kind cannot be accepted as evidence of physical inferiority or physical deterioration, for, quite to the contrary, the lesser weight, under given conditions, may be an advantage rather than otherwise. The final recommendation of Dr. Harris is therefore sound:

> As the great majority of the men composing these boards are inexperienced in this particular kind of work, and as many new questions will come to them for solution, it would be very advantageous if there were some one of experience in the Provost-Marshal General's office to whom they could turn for advice. Strange as it may seem there is not a physician attached to that office.

ARMY REJECTION EXPERIENCE IN GREATER NEW YORK

Another contribution of real value to the subject matter under consideration is by Dr. Edward F. Hurd, of New York, based upon the work done by the examining physicians of the Local Board for Division 20, Bronx, New York City (J. A. M. A., January 5, 1918). In this case the medical member of the Board had secured as his associates six other physicians of the Bronx, all of whom but one had for many years been engaged in the general practice of medicine. The exception was a specialist in diseases of the eye, ear, nose and throat. The men were examined in groups of ten in the gymnasium of the New York University, and after having been asked a few questions made mandatory by the Selective Draft Law, the procedure was as follows:

> The man was then told to retire behind the screen. When he stepped, stripped, from behind the screen, he was taken in charge by the first physician. who weighed him and took his height and chest measurement. He was then passed to the second physician, who examined his teeth, nose and throat, and made a general inspection for deformities and abnormalities, including flatfoot, hammertoe, etc. The third physician examined by stethoscope the heart and the lungs. The fourth covered hernia, varicocele, hemorrhoids and history as to venereal disease; if any question elicited a suspicion of diabetes or nephritis, a sample

of urine was obtained in the presence of the physician, and a university professor of chemistry made the examination at once, the result being known before the man was dressed. The fifth physician was stationed in a small room fitted with Snellen's test cards, and there examined the eyes and the ears. The physical examination blank was passed from physician to physician, each making a record of his findings.

It is explained by Dr. Hurd that if during the course of the examination any physician detected a condition which he considered sufficient to disqualify the registrant, he consulted the sixth physician, who was on duty for re-examination. These two failing to agree, they appealed to the board physician: the verdict of the three was final. It is stated that under the foregoing arrangement it was possible "in a few hours to examine 175 men with such thoroughness that to date, with 70 per cent. of the quota in camp, not a man has been returned because physically deficient." Before leaving the building, each man was informed as to the result of his physical examination and given an opportunity to file a claim for exemption or discharge, the chairman of the Local Board taking charge of this branch of the work.

EFFECTS OF DISCRETIONARY POWERS ON THE REJECTION RATE

The actual results under this procedure in 1,800 cases were as follows: The number of rejections for physical reasons was 705, or 39.2 per cent. of the total. It is stated by Dr. Hurd that "This seems a staggering proportion of unfitness among men between the ages of 21 and 31, a time when physical perfection is most likely to be found; but when we consider that 232 of these were underweight, a condition which may not mean any permanent physical defect, the high rate becomes more readily understandable." He explains, however, that "This figure would have been much higher had not the examining physician departed from the arbitrary dictum of the rules and regulations as to relative weight and height." "In cases in which the subject, although underweight, was in all other essentials in good physical condition, *he exercised his personal judgment* to the effect that camp life would probably improve the weight, and accepted the man. Conversely, of overweights: none of the latter were rejected unless really obese." With reference to the 232 men underweight, the greatest number were aged 29; the smallest 27. It is therefore evident that the group under review was not sufficiently large for entirely safe conclusions. Out of 477 native-born registrants, 151, or 31.7 per cent., were underweight; out of 149 Russians, 66, or 44.3 per cent., were underweight. Since the army standard is the same for all races, in disregard of the fact of decided anthropometric variations, conclusions based upon these percentages are certain to be misleading.

Other causes of rejection were: flatfoot, 22; varicocele, 15; bad teeth, 20; tuberculosis, 4; bad eyes, 30; deformities, including hammertoe, etc., 36; varicose veins, etc., 8; obesity, 22; albuminuria, 11; bad

ears, 3; other causes, including insanity, 33. These statistics cannot be considered evidence of a really serious degree of physical deterioration, or, in a considerable proportion of cases, as obvious evidence of unfitness for military service. Nevertheless, the conclusions of Dr. Hurd are entitled to weight, being in brief, that

> The findings of this board show that men of draft age who hold clerical positions are the poorest physical specimens. We shall waive the question whether deficient physical equipment impelled these men toward the inactive occupation of the clerk, or whether the sedentary life of the clerk has resulted in poor physical condition: there is probably a good deal to be said on both sides. Undoubtedly chronic constipation, lack of exercise and fresh air, with the resulting soft flabby muscles, would seem to be the principal causes of underweight and hernia. Take these men out of their stuffy offices and put them into camp, make them live in the open with regular exercise and regular hours, and they will soon be brought up to the standard.

The statistical tables included in the report by Dr. Hurd are not in conformity to standardized methods of statistical analysis. The causes of rejections according to age are not correlated to the corresponding numbers of men examined, so that the true rejection ratio for different causes cannot be determined from the data thus far made available. It is properly suggested, however, by Dr. Hurd, that "The compilation of such data from all districts of Greater New York would be of enormous statistical value." Such statistics would be practically useless, unless compiled in a proper manner, for *mere data* on the subject of army rejections are certain to be misused by those who are wrongfully alarming the public as regards the alleged physical deterioration of American men of military age.

MISLEADING CONCLUSIONS REGARDING PHYSICAL REJECTIONS UNDER THE FIRST SELECTIVE DRAFT

Among others in authority, Prof. D. A. Sargent, Director of Physical Training at Harvard, has given public utterance to the view that "Any one who has read the Provost-Marshal General's recent report and noted that from 25 to 75 per cent. of our young men were exempted from military service on account of physical disability and preventable disease, cannot help having some misgiving as to the future of our country." Elsewhere in the same discussion, on "The Draft's Showing Up of Physical Defects of Young Americans and the Remedy," Prof. Sargent observes that "Yet this is the condition of the United States today, where, as we have seen, over 50 per cent. of our young men have been rejected as unfit for military service, while the country is spending millions upon millions at the training camps in trying to get those who have been accepted in fit condition to perform the duties of a soldier." Now, as a matter of fact, it is not correct to say that 50 per cent. of the men have been rejected for physical reasons, or, in other words, on the ground of a physical impairment of a sufficient degree to preclude the immediate or remote possibility

of efficient military service in the field. Of all the men examined, at most 35 per cent. were rejected on this ground and in conformity to methods of examination more or less antiquated and inadequate to the present purpose. A careful examination of the causes of rejections as far as analyzed proves conclusively that probably one-half, if not more, were not of a sufficiently serious nature to justify the unconditional rejection of the registrant or conscript as unfit for military service at home and in the field.

MISLEADING USE OF ARMY REJECTION EXPERIENCE UNDER THE VOLUNTARY SYSTEM

Even more misleading are the rejection data which have been utilized by Dr. J. H. Quayle, of Cleveland, Ohio, in connection with an argument for the "Reclamation of Men Rejected Under the Draft," however admirable the suggestion may be otherwise concerning the far-reaching possibilities of physical rehabilitation. Unquestionably, much can be done in this respect, and much ought to be done, for the waste of life and strength because of ignorance and indifference is incalculable, but the end in view does not justify the misleading use of statistics which is certain to unduly alarm the public and lead to entirely erroneous conclusions on the important question of physical status and physical deterioration. Dr. Quayle applies the rejection statistics of the Surgeon General's report for a single year, 1916, to the 9,000,000 men called out under the draft, of which it is alleged only 1,800,000 would be physically fit, and 7,200,000 would be rejected. This conclusion is absolutely grotesque and likely to hinder rather than help the cause of the rehabilitation of those properly rejected under the draft. The argument is advanced by Dr. Quayle upon the hypothetical assumption that if 7,200,000 of the men were rejected, among others, 938,232 would be suffering from venereal diseases, 564,768 from heart disease, 525,600 from diseases of the ear, including defects of hearing, 421,704 from diseases of the eye, including defects of vision, 346,392 from flat feet, and 296,640 from alcoholism. There are no statistics extant which justify these conclusions, but it may safely be asserted that they are entirely erroneous and grossly at variance with the facts. For, as observed in the earlier discussion, the rejection rate experienced in connection with the selection of volunteers for army service during a period of peace is not evidence of the physical status of the nation, and not even of the class of men examined. Furthermore, recruiting rejection statistics of the Army as reported by the Surgeon General's office include ages 18 to 44, whereas the Selective Draft experience is limited to ages 21 to 31. The fact, also, must be kept in mind that voluntary applicants for military service during a time of peace include a disproportionately large number of men who have lost their employment because of dissipation or immoral conduct, etc., and have applied to the Army or Navy as a suitable place for reform.

It is only natural that among this element the proportion rejected on account of venereal disease and alcoholism should be relatively high, for the statistics of the Surgeon General's office in this respect are in marked contrast to the results of the very limited analysis of the causes of rejections which has thus far been made by the Provost-Marshal General's office. *

COMPARATIVE REJECTION STATISTICS OF LIFE INSURANCE EXPERIENCE

Attempts have been made to compare the ratio of rejections in ordinary life insurance experience with the rejection rate in the United States Army previously to the war. All such comparisons are seriously misleading and absolutely useless for practical purposes. The army rejections include a large proportion of physical causes which do not constitute a serious impairment in its relation to life expectancy. Rejections for life insurance are exceptionally severe with reference to habits, as best illustrated by the fact that in the experience of The Prudential during 1911-15 the rejections on account of alcoholism were 12.7 per 1,000 examined, against 3.7 for the United States Army during the same period. In contrast, rejections for venereal diseases are relatively low in life insurance experience, largely, of course, on account of the fact that the class or element most subject thereto is not knowingly solicited for life insurance purposes. In the Prudential experience the rejection rate on account of venereal diseases was only 1.1 per 1,000 examined, against 12.5 for the United States Army. On account of the exceptional care exercised in life insurance examinations with reference to the condition of the heart and of the urinary organs the rejection rate for this group of impairments is much higher. In the Prudential experience the rejection rate for heart diseases was 25.1 per 1,000, against 10.2 for the United States Army, for respiratory diseases 12.7, against 2.9, and for diseases of the genito-urinary system 18.6, against 2.8. Combining these three groups of organic impairments it appears that against a rejection rate of 56.4 per 1,000 on account of diseases of the heart, the respiratory organs and the urinary system in the Ordinary experience of The Prudential, the corresponding rejection rate in the United States Army was only 15.9.

The most important causes of rejection in the United States Army are relatively uncommon in the experience of a representative life insurance company. The most important of these causes, with a due regard to the higher average age of insurance applicants, are as follows:

Weakness of mind, Prudential, 0.4, U. S. Army, 1.7; varicose veins, Prudential, 0.1, U. S. Army, 1.6; hernia, Prudential, 0.1, U. S. Army,

* This rule would seem to indicate that upon the medical ascertainment of a single mental or physical disqualification for military service, no further medical examination is made of the registrant who is unconditionally rejected. The resulting statistics therefore require to be interpreted with extreme caution, since many important mental and physical defects would no doubt be ascertained by a complete examination which apparently is made only in the case of registrants considered eligible for qualified or unconditional acceptance.

3.5; skin diseases, Prudential, 0.1, U. S. Army, 2.3; curvature of the spine, Prudential, none, U. S. Army, 1.1; flatfoot, Prudential, none, U. S. Army, 6.2; other diseases of organs of locomotion, Prudential, none, U. S. Army, 3.1; defective teeth, Prudential, none, U. S. Army, 2.4; defects of development, Prudential, none, U. S. Army, 2.5; diseases of the ear, including defective hearing, Prudential, 0.7, U. S. Army, 9.6; diseases of the eye, including defects of vision, Prudential, 0.01, U. S. Army, 8.0; injuries, Prudential, none, U. S. Army, 3.7; abnormal height, Prudential, none, U. S. Army, 0.4. This formidable group of impairments accounts in the aggregate for 46.1 per 1,000 of the rejections in the U. S. Army, against only 1.4 in the experience of The Prudential. But aside therefrom 22.9 per 1,000 were rejected for causes not physical in the Army for which there are no corresponding rejections in the experience of The Prudential. Among the physical causes, however, overweight accounted for only 0.4 per 1,000 of the rejections in the Army, against 5.1 in the experience of The Prudential. This difference illustrates precisely the effect of rigid army standards which practically preclude the application of men obviously overweight. The standards of examination are probably more restricted in life insurance experience, but the examination itself in cases of obesity is more thorough, in view of the fact that the mortality of persons overweight is invariably in excess of those of normal weight. On account of underweight the rejections in the Army accounted for 2.7 per 1,000, against 2.1 in the experience of The Prudential. The pathological significance of underweight is considered of less serious significance at the present time than in former years, especially in its relation to a predisposition to tuberculosis. It is probably of more immediate importance in its relation to physical endurance in active military service.

IMPORTANT CHANGES IN THE REJECTION RULES UNDER THE SELECTIVE DRAFT

As stated elsewhere, the ratio of rejections is primarily a question of the precise army regulations governing the physical examination. The regulations were materially changed under date of January 28, 1918, and in a preliminary statement with reference thereto it is said that, "Physicians on the Local Board are not required to make a complete examination of every registrant." The moment the physician on the Local Board finds a mental or physical defect placing the registrant within the standards of unconditional rejection the physician on the Board is required to indicate the fact on the blank and refer the registrant to the Medical Advisory Board. It is explained, however, that "Registrants cannot be declared physically qualified for general military service until the complete examination has been made by the physician on the Local Board, with the finding that the candidate comes in every

instance within the standards of unconditional acceptance or without remediable defect." The new regulations provide special examinations and standards for unconditional rejection and for unconditional acceptance, with or without remediable defects on reference to the Medical Advisory Board. The final classification of the registrant "physically qualified for special or limited military service," depends entirely upon the recommendations of the Medical Advisory Board and not upon the action of the Local Board. As illustrations of the lesser degree of rigid conformity to earlier theoretical principles of examination, the following are of interest:

Chronic alcoholism.—The registrant on examination must show suffused eyes, prominent superficial blood-vessels of nose and cheek, flabby, bloated face, red or pale purplish discoloration of the mucous membrane of the pharynx and soft palate; muscular tremor in the protruded tongue and extended fingers, tremulous hand-writing, emotionalism, prevarication, suspicion, auditory and visual hallucinations, persecutory ideas. The history or evidence that the registrant has been frequently or grossly intoxicated is not of itself sufficient for a diagnosis of chronic alcoholism and rejection.

Skin Conditions.—Accept registrants who have skin diseases which run an acute or temporary course, or are trivial in character, or do not interfere with the general health, or are not incapacitating. Among the common skin conditions coming in this category are: Acne, Anomalies of Pigmentation, Scars, Condylomata, Diseases produced by pus infection, Eczemas which have not been of long duration, all forms of Naevi not producing great disfigurement or deformity, all forms of Pediculosis, Scabies, Psoriasis, all forms of Ring Worm, Warts, Callosities.

Syphilis.—Accept all registrants with syphilitic lesions of the skin.

Conditions of the Neck.—Accept registrants with normal necks, moderate enlargement of the thyroid with no toxic symptoms. Accept with a few palpable lymph glands with or without healed scars and no sinuses.

Lungs.—Reject no registrants for diseases of the lungs, pleura, mediastinum, and chest wall, except men with tuberculosis or other diseases of lungs, pleura, and mediastinum, who are confined to their beds, when verified histories establish unmistakably the existence and long duration of diseases.

Heart and Blood-vessels.—Following specific instructions regarding the examination to be made by physicians of the Local Boards, the regulations read that after this examination the Local Board shall accept all registrants who come within the standard for unconditional acceptance, which is as follows:

Standard for Unconditional Acceptance.—Subjects with apex impulse within the left nipple-line and not below the fifth interspace, of normal, not heaving character, with normal sounds, free from murmurs, without pulsation or dullness above the base of the heart, with regular pulse of normal rate, who have no unusual thickening of the arteries or evidence of high blood pressure, and who show a normal response to the exercise test, may be unconditionally accepted.

Abdomen.—Accept all registrants who give a history of abdominal trouble suggesting a chronic appendicitis or gall-bladder disease and who on examination present no signs of such diseases.

Accept all registrants with small or medium reducible inguinal, femoral, umbilical, and post-operative hernia.

Accept all registrants with abdominal scars who give a history of operation for hernia, appendicitis, gall-bladder disease, or for some abdominal injury, providing there is no large hernia in the scar.

Genito-urinary organs and venereal diseases.—Accept all cases with no signs of disease of the genito-urinary organs, all acute and chronic cases of gonorrhea and syphilis who have no complications permanently incapacitating.

Lower Extremities.—Accept all foot and ankle lesions if they do not interfere with the wearing of an ordinary shoe and with walking and weight-bearing power; hammer-toe, hallux valgus, bunion, callosities, the different types of flat-, club-, and claw-foot are to be accepted if they come within the above requirements.

This is amplified by a specific rule which reads: "And reject no foot cases."

Height, weight, and chest measurements.—Registrants whose chest measurements do not come within the limits of the table and who have no disqualifying defect are referred to the Medical Advisory Board.

Accept registrants above 78 inches in height when exceptionally well proportioned. Refer all other such cases to the Medical Advisory Board. Reject registrants of less than 58 inches in height. Refer to the Medical Advisory Board registrants whose height is more than 58 inches and less than 60.

Reject registrants whose weight is less than 100 pounds, unless it is plainly due to some recent illness and otherwise the registrants have no disqualifying defect.

Registrants whose weight is more than 100 pounds and less than 114 pounds and who have no other disqualifying defect are to be referred to the Medical Advisory Board.

Registrants under weight in proportion to their height, unless it is plainly due to some temporary cause, are referred to the Medical Advisory Board. When this underweight can reasonably be explained and the registrant otherwise is physically fit, accept.

Registrants with over-weight are to be accepted, unless the obesity interferes with normal physical activity. Refer all doubtful cases to the Medical Advisory Board.

The examiner is specifically requested to take the measurements "with the greatest care." (The standard tables in use have been given on page 46.)

THE POSSIBLE SAVING IN MAN-POWER AND GAIN IN MILITARY EFFICIENCY UNDER THE NEW REGULATIONS

Under these revised regulations a considerable proportion of men will hereafter be accepted which under the First Draft were unconditionally rejected. Practically all the important causes of rejection have been sufficiently modified to result in a substantial increase in the number of men hereafter accepted with or without remediable defects. In view of the fact that so large a proportion of men in the past were rejected for dental defects or deficiencies, the following new rules regarding dental requirements are of special importance:

Dental Requirements.—Accept registrants who have three serviceable natural masticating teeth above and three below opposing and three serviceable natural incisors above and three below opposing. All these teeth must be so opposed as to serve the purpose of incision and mastication. Therefore, the registrant shall have a minimum total of six masticating teeth and a minimum total of six incisor teeth. The needed dental treatment will be performed at the cantonment. However, if time permits, a registrant, if he prefers, may have the necessary work done at home previous to his induction into military service.

By way of contrast, the former rule is given, which reads as follows:

The person must have at least eight serviceable natural masticating teeth, either bicuspids or molars, four above and four below, opposing, and six serviceable natural incisors or canines, three above and three below, opposing. These teeth must be so opposed as to serve the purposes of incision and mastication. There must be one molar above and one below on one side which occlude; the remaining six opposing masticating teeth may be either bicuspids or molars.

The practical significance of this change is indicated by the fact that dental defects accounted for 8.5 per cent. of the total rejections, according to the special analysis made of 10,258 rejections by the Provost-Marshal General's office. Since these rejections were made by camp surgeons, the proportion of rejections for dental defects by Local Boards was probably much higher. It is specifically stated in the new regulations that "No registrants can be rejected on account of teeth defects."

Finally, as regards the degree of deficiency for disqualification, on general grounds it is said in the regulations that

The standards for unconditional rejection which places the registrant in the class physically deficient and not physically qualified for military service are clearly defined. When the Local Board is in any doubt, the registrant should be referred to the Medical Advisory Board.

This Board is governed by the rule that

If the registrant is held to be physically disqualified by the examining physician, the Local Board shall, unless it decides by unanimous vote that the disqualification is so obvious as to leave no room for reasonable doubt, send the registrant before such Medical Advisory Board in the manner just provided.

This shows, in other words, "that there must be a unanimous vote of the Local Board to disqualify the registrant and the disqualification must be so obvious as to leave no room for reasonable doubt."

Even as regards temporary defects, it is now provided that

Registrants confined to their homes, or hospitals, or who present themselves with some temporary defect the result of an acute disease, injury, or operation, or who are waiting for operation, should be granted a reasonable delay for completing the physical examination. All of these cases should be thoroughly investigated by the physician on the Local Board.

The foregoing extracts from the new official regulations make it sufficiently clear that under the present procedure on the part of the Local Board and the Medical Advisory Board a much larger proportion of registrants will be accepted for military service than in the past, and that in so far as minor ailments or physical defects or deficiencies are ascertained by the examination, they will be remedied, if possible, or the registrant will be placed in a class of service where the defect or deficiency can not prove injurious to health or life. Under the new regulations, therefore, the examinations will disclose a much lesser degree of apparent physical deterioration among men of

the draft age than heretofore, and it is to be hoped preclude hereafter the dissemination of sensational and alarming assertions concerning the alleged physical decline of American manhood.

RESULTS OF THE ARMY REJECTION EXPERIENCE IN THE UNITED KINGDOM

The experience of the United Kingdom has been much the same as in this country. At the time of the South African War three out of every five men had been originally rejected on the ground of physical unfitness for active military service. Out of 679,703 recruits examined between 1893 and 1902 only 424,651, or 62.5 per cent., were accepted. As observed in a letter from London, dated March 5, 1918, in the *Journal of the American Medical Association,* of April 6, 1918, "An army of over a quarter of a million had thus to be cast aside because it was below the military standard of the time." If the rules and regulations had been in conformity to the observations of Sir W. Aitken, Examiner in Medicine for the Military Medical Service, and Pathologist attached to the Military Hospitals during the Russian War, and had been adopted by Great Britain at the outset of the present war, a much larger army would actually have been available and without any serious risk whatever regarding the physical efficiency of the men for active duty in the field. The present necessity of replacing the enormous loss of man-power in consequence of the war is resulting in the lowering of the qualifications for service: but it is to be appre-

hended that many of the rules and regulations are not in strict conformity to scientific principles of anthropology and medicine. The committee appointed by the British Government in 1903 on the Alleged Deterioration of the National Physique made a systematic investigation and an admirable report in 1904, the recommendations of which were entirely disregarded. The need for an anthropometric survey, emphasized at the time and repeatedly brought forward by the Royal Anthropological Institute, has been clearly recognized by those familiar with the facts. The Conjoint Board of Scientific Societies set up by the Learned Societies and Corporations of Great Britain has recently appointed a strong committee to prepare a plan for a new survey, the committee being of the opinion that "Such a survey is a matter of national importance and one that can be carried out by machinery already in existence. All that is now necessary is to set up an Advisory Council to co-ordinate the work carried on by the varied Government departments and bureaus to deal with the statistics as they are collected." Such a survey is not only required for Great Britain and Ireland, but as much if not more so for the United States. The general principles of such a survey have been brought forward in the discussions of the Committee on Anthropology of the National Research Council, which, however, has failed to secure the required governmental support. The lamentable results of ignorance and indif-

ference in the medical and physical examination of recruits are not even, as yet, as clearly recognized as is necessary to prevent a further deplorable waste of man-power, both in the unnecessary rejection of those fit for military service in the field and in the wrongful acceptance of men physically or otherwise disqualified for the extraordinary stress and strain of service on the battle field. The problem, it is true, concerns at most but a fraction of the entire army, for there can be no question of doubt that the large majority of our young men are not only as physically fit but in all probability physically superior to any army that has ever gone out for active service on the battle field. As properly said in the London letter to the *Journal of the American Medical Association,*

> The victorious manner in which our national armies * have come through conditions more severe and more trying than any to which armies of former times were ever subjected seems to allay any fear that we are not equal to our forefathers in either vigor of body or strength of will. But every country in Europe has its contingent of men unfit to bear arms and unfit for the physical brunt of civil life. Before the war Germany had to reject 16 per cent. of her young men, because weakness or deformity rendered them useless as soldiers. We also have our share of the unfit; the size of that share is the index of our physical deterioration as a nation. Under the present conditions the need for a physical survey of the people, instead of being merely a matter of theoretical importance, as it was at a former time, has become a matter of urgent, practical importance. The total number of our population is not the most important matter for us at present; it is the number of our fit men and women, boys and girls, that matters. The medical examinations instituted by the Ministry of National Service really constitute a physical census of our man-power.

URGENCY OF A NATIONAL ANTHROPOMETRIC SURVEY AND NEW PHYSICAL STANDARDS

These conclusions apply with even greater force to the men of our new National Army, which in the cantonments as well as on the western front has given an excellent account of itself as regards physical endurance, of which the country has every reason to feel proud. If only, however, one-tenth of the entire Army represents a group below the ideal standard of physique and capacity for physical endurance in active military service, the question of their proper physical care and service classification is one of considerable practical importance. If even as low a proportion as 15 per cent. of all the registrants are properly rejected on physical grounds, the question of their rehabilitation is of equal if not greater concern to the Government and the people at large. It requires no sensational or alarmist assertions to emphasize an obvious duty in this respect, however lamentably that duty has been ignored in the past. All questions of physical growth and development, physical training, military and industrial service proportionate to physical

* The reference, of course, is to the national armies of Great Britain and the British Colonies and self-governing Dominions.

strength and physical endurance depend primarily for their successful solution upon a correct ascertainment of physical standards, with a due regard to race, locality, occupation, etc. A mere heterogeneous mass of measurements and general-average conclusions based upon mere data cannot successfully meet the exacting requirements of the present time; nor can the methods in use heretofore in connection with the examination of recruits be utilized to advantage any more than the methods employed for examination purposes by life insurance companies. New standards are required and these must be derived from accurate measurements of the registrants, if not in the aggregate, at least in selected groups, with a due regard to race and the regional divisions of the country, and, if possible, the previous occupation of the registrant. There is therefore an obvious urgency for a national anthropometric survey, in conformity to the preliminary recommendations of the Royal Anthropological Society of Great Britain, of the plan of which a copy is reprinted in Appendix B.

NEW STANDARDS OF PHYSICAL EXAMINATION

New standards of physical examination governing the entrance to all branches of the Army of the United States for the use of Medical Officers of the Regular Army, National Army, National Guard, Medical Reserve Corps, Recruiting Officers of the United States Army and Local Boards and Medical Advisory Boards under the Selective Service Regulations were promulgated by the Secretary of War under date of June 5, 1918. These rules and regulations are in a large measure based upon actual experience and qualified consideration on the part of those directly responsible for the best possible results. Of course, some of the rules are subject to further modifications, but, in the main, the new regulations will go far to facilitate the fundamental purpose of the Selective Draft, *i. e.*, "To procure men who are physically fit, or who can be made so, for the rigors of field service or for special and limited service," but the final determination of these questions is left to the judgment and discretion of the examining boards appointed under the authority of the Selective Service Law and to the military examining surgeons of mobilization camps and other army posts and stations.

The most important qualification, as elsewhere pointed out, which has practically remained unchanged, is that "Local Boards need not make a complete physical examination of every registrant. Upon the discovery of a defect requiring unconditional rejection the physician of the Local Board need proceed no further; but in all other cases there must be a complete examination." To avoid a possible misunderstanding, it requires to be pointed out with special reference to the Medical Advisory Boards that they, also, "are not required to make a complete examination of every registrant," if "at any point in the

course of the examination it is found that the registrant is physically or mentally unfit within the standards of unconditional rejection, then the examination need proceed no further." These qualifications or restrictions obviously preclude the general use of the Selective Draft experience data as evidence of the true physical status or bodily condition of the male population of draft age. The data require, therefore, to be used in all cases with extreme caution, but especially in their application to the most important problem of available man-power for military service.

The order of procedure in the physical examination includes nineteen subdivisions, as follows:

REQUIRED ORDER OF PROCEDURE IN PHYSICAL EXAMINATIONS UNDER THE SELECTIVE DRAFT

1 The eyes
2 The ears
3 The mouth, nose, fauces, pharynx, larynx, trachea, esophagus
4 Dental requirements
5 Skin
6 Head
7 Spine
8 Scapulae
9 Extremities
10 Height, weight and chest measurement
11 Abdomen
12 Neck
13 Genito-urinary organs, venereal diseases
14 Mental and nervous diseases
15 Lungs and chest-wall
16 Heart and blood-vessels
17 General
18 Temporary defects
19 Malingering

It is quite evident that this order of arrangement for physical examination purposes is not in conformity to a thoroughly developed, systematic method of procedure, particularly with a due regard to the practical importance of the ascertainment of impairments requiring unconditional rejection. Since a complete examination of every registrant is not required, it is of the first importance, at least for general purposes, that the more serious pathological impairments shall be ascertained first, or previously to minor physical defects, though possibly the latter be of even major military importance. For to the extent that the medical results of the Selective Draft examinations can be utilized, for illustration, for the purpose of determining incipient cases of pulmonary tuberculosis, this object would be defeated by the prompt rejection on primary examination of men found to suffer from some serious visual impairment, deafness, dental defects, etc. It would not seem going too far, therefore, to suggest that the order of procedure in the examination should be so modified as to materially increase the assurance that the more serious pathological or physical conditions, such as tuberculosis, syphilis, hernia, etc., may be first ascertained as unconditional causes of rejection rather than causes or conditions of secondary general importance from the point of view of preventive medicine, public health, etc.

It is, however, quite difficult to establish an order of procedure suitable to other requirements than those of the military service, but even for the latter purpose a more systematic anatomical and osteological arrangement would no doubt prove in actual practice distinctly more useful, and possibly less time-consuming than the one provided for under the revised standards of examination.

SUGGESTED ORDER OF PHYSICAL EXAMINATION

1 The height, weight and chest measurement
2 The head
3 The eyes
4 The ears
5 The mouth, nose, fauces, pharynx, larynx, trachea, esophagus
6 Dental requirements
7 Neck
8 Scapulae
9 Spine
10 The extremities
11 Lungs and chest-wall
12 The heart and blood-vessels
13 The abdomen
14 Genito-urinary organs and venereal diseases
15 Mental and nervous diseases
16 Skin
17 General
18 Temporary defects
19 Malingering

This suggested order of examination, however, is merely a compromise. It fails particularly in the direction of the obviously practical requirement that the more serious physical impairment should be certain of first ascertainment, rather than the minor physical defects and deficiencies which also disqualify for military service. If this point of view were hereafter to prevail, it would probably be best to examine the lungs immediately after the chest measurements and to follow with the examinations of the heart and blood vessels, the abdomen and the genito-urinary system. This arrangement would give the preference to the ascertainment of serious pathological impairments over less important physical defects, deformities and deficiencies. If followed more or less in this order, the bodily impairments of general public importance, especially in connection with public health activities and preventive medicine, would be ascertained with reasonable thoroughness according to their relative significance. Valid objections may, of course, be raised on practical grounds against a complete examination in each and every case, for, as has well been said by Major General Crowder, the object of the Selective Draft examination is to raise an army and not to furnish information, statistical or otherwise; but nevertheless it might be considered well worth while on the part of the nation to subject each and every registrant to a thorough physical examination and to ascertain *all* the existing defects, deficiencies and impairments, with a view to their subsequent treatment, cure or correction, rather than to abruptly conclude the examination with the determination of the first disqualification sufficient for unconditional rejection for military purposes only.

The new standards mark an important departure from those elsewhere referred to in this discussion, in that the minimum height is raised to 63 inches from 61 inches under the standards adopted May 18, 1917 (but for recent change, see page 45, and for former standards, see page 46). This change would, perhaps, be unobjectionable with regard to registrants of native ancestry, but it must be considered unfortunate with reference to registrants of foreign-born parentage of South-European racial origin. There can be no question but that a considerable proportion of such men will probably be rejected exclusively on the ground of deficiency in stature, but who otherwise would in every respect be qualified for military service in the field. If our own physical standard were to be rigorously applied to the French, Italian and Portuguese armies at the present time, there unquestionably would be a material reduction in man-power upon purely theoretical considerations, which, considering the supreme necessities of the war, might involve truly momentous consequences. It would seem much more rational, therefore, to apply the recruiting standards of foreign armies to American registrants of the same type of foreign origins than to make use of a purely arbitrary general standard primarily applicable to the registrants of the continental United States, of a racial descent normally subject to a quite different frequency distribution in height, such as those of English, Scotch, Irish, German and Scandinavian parentage. The loss in man-power on account of the rigorous use of this theoretical requirement as to minimum stature may not, perhaps, be so very serious for this country, but in any event it is seemingly as unnecessary as it is clearly unscientific.

The new regulations are a notable contribution to a much-neglected branch of medicine. To an increasing extent medical examinations are being made of applicants for industrial service, and the practice of life insurance has become so universal that sooner or later the larger portion of the male population will at one time or another have been subjected to one or more examinations, though, of course, for purposes somewhat different from those which apply to the Army in time of war. All of these examinations, however, have much in common, and to the extent that the practice is made more scientifically conclusive as well as generally useful the cause of preventive medicine, health-conservation and efficiency in man-power will be advanced to a position never heretofore realized in any country of the world.

THE AGE PERIOD OF MILITARY SERVICE IN TIME OF WAR

The war demands men, more men, and still more men. The wastage in modern battles is enormous. The tendency is, therefore, to lower the draft age as a matter of ready convenience, rather than to seek more intelligently for the physically fit among those who are within

the present age period of military conscription. The proposed lowering of the draft age for the National Army of the United States would, however, be a calamity the ultimate consequences of which might be even more serious than the immediate loss of life, limb and health on the battle field. All the standard authorities on army recruiting who have thoughtfully and impartially considered the question of age in its relation to military service are strongly opposed to the inclusion of mere boys, or what Sir William Aitken has so admirably described as "growing lads." If the quotas forthcoming from the present age period of the Selective Draft, 21 to 31, are insufficient and if improved and more rational methods of medical examination or remedial physical training are inadequate, it would in every way be preferable to raise the draft age even, if necessary, to 50 and over, rather than to lower the age by a single year or two to 20 or 19. In the words of Sir William Aitken (sustained by distinguished English, French and American army authorities), in his treatise "On the Growth of the Recruit and Young Soldier," which deserves to be much better known in this country than there are reasons for believing is actually the case:

> It has been fully demonstrated that the placing of "growing lads" in the field who are physically immature has not only been poor economy but has sometimes been fatal to the success of military operations. Such lads have always been found disqualified and unable to perform the duties or to endure the hardships incident to the life of a soldier.

Also, according to the late Dr. Parks whose treatise on Public Hygiene is a standard work of reference throughout the world:

> There is no doubt that to send young lads of 18 to 20 into the field is not only a lamentable waste of material, but is positive cruelty. At that age such soldiers, as Napoleon said, merely strew the roadsides and fill the hospitals. The most effective armies have been those in which the youngest soldiers have been 22 years of age.

These are the words of military wisdom, based upon military experience. They require to be taken to heart by those who in very truth have the future physical welfare of the nation in their keeping. We are, it is said, in this war to the last man and the last dollar; but that very policy precludes the ruthless waste and wrongful sacrifice of the nation's boyhood, unless the exigencies of the military situation are such as to imperatively demand the lowering of the draft age, which, considering our vast population, our healthy and resistant manhood of mature ages must be considered, at this time, at least, a remote contingency.

APPENDIX A

Examination blank tentatively recommended by the Committee on Anthropology of the National Research Council

SMITHSONIAN INSTITUTION

United States National Museum

Name..... Age.....

Occupation .....

Born in (what state or country).....

Birthplace (state or country):

of father ....., of mother .....

of father's father....., of mother's father.....

of father's mother....., of mother's mother.....

MEASUREMENTS

BODY:

Weight .....

Stature .....

Height to shoulder (mean).....

Height sitting .....

HEAD:

Deformation of .....

Length .....

Breadth .....

Height .....

FACE:

Length to nasion.....

Length to crinion.....

Breadth, bizygom .....

MISCELLANEOUS:

Shoulders:

Breadth .....

Chest:

Mean breadth at nipple height.....

Mean depth at nipple height.....

OBSERVATIONS

Color of eyes.....

Color of hair.....

Nature of hair.....

Nose .....

Nasal septum .....

Lips .....

Chin .....

Body and limbs.....

Dynamometric Pressure { r. hand..... / l. hand.....

APPENDIX B

THE ROYAL ANTHROPOLOGICAL INSTITUTE

50, Great Russell Street,
London, W. C.

To the Honorary Secretary of the
Board of Scientific Studies.

Dear Sir:

PHYSICAL SURVEY OF THE BRITISH PEOPLE.

We beg to acknowledge receipt of your letter of October 23rd, 1916, in which you inform us that the Board of Scientific Studies invites the Council of the Royal Anthropological Institute to submit a report to the Executive Committee of the Board, on the "Need of a Physical Survey of the British People."

The Council of the Institute has given this matter its serious consideration from time to time during the last twelve years, and has been steadfastly of opinion that such a survey is necessary.

We have the honour to submit particulars of the conclusions arrived at by the Council after careful review of the question in the light of present conditions.

Considerations Bearing on the Need for a Survey.

In 1903 it was stated by the Inspector-General of Recruiting that in certain areas as many as 40 per cent., or even 60 per cent., of men who offered themselves for Military Service were rejected because they were found to be physically unfit. The occurrence of such a large number of unfit men in the general population gave rise to a suspicion that a proportion of the British people was undergoing physical deterioration. Whether such was the case or not could not be determined, however, since there was no existing standard with which the measurements made could be compared. At no period in the history of this country has any attempt been made to obtain an accurate estimate of the condition of bodily development amongst the people, and there can obviously be no basis for comparison until an initial survey is made of at least a representative part of the population. The Council feels that it is necessary to lay stress upon the expediency of placing our knowledge of the men of the heart of the Empire on a more satisfactory footing.

Previous attempts to institute a Survey.—(1) In September, 1903, largely as a result of representations made by Fellows of this Institute and members of the Anthropological Section of the British Asso-

ciation, the Lord President of the Council—the late Duke of Devonshire—appointed an Inter-Departmental Committee "to make a preliminary inquiry into the allegations concerning the deterioration of certain classes of the population." The exact Terms of Reference were:

> (1) To determine, with the aid of such counsel as the medical profession are able to give, the steps that should be taken to furnish the Government and the nation at large with periodical data for an accurate comparative estimate of the health and physique of the people;
>
> (2) To indicate generally the causes of such physical deterioration as does exist in certain classes;
>
> (3) To point out the means by which it can be most effectually diminished.

After sifting all the available evidence, and examining a large number of witnesses, the Committee issued a Report * in the autumn of 1904. Their first and chief recommendation was the institution of an "Anthropometric Survey," the recommendation being couched in the following terms:

> "With a view to the collection of definite data bearing upon the condition of the population, the Committee think that a permanent Anthropometric Survey should be organized as speedily as possible, upon the lines indicated in Part I of this Report." (Report, Part I, page 84.)

The Committee were constrained to place this proposal at the head and front of their recommendations, because they found that, in the absence of any former standard for comparison, it was impossible to determine whether any physical change was occurring in the British population as a whole, or in any particular section of it. The following quotation from the Report (Part I, page 92) indicates the views of the Committee as to the occurrence of deterioration:

> "The Committee hope that the facts and opinions they have collected will have some effect in allaying the apprehensions of those who, as it appears on insufficient grounds, have made up their minds that progressive deterioration is to be found among the people generally."

The Council of the Royal Anthropological Institute hopes and is ready to believe that this conclusion was justified, but is nevertheless of opinion that whether the physique of the population is improving, remaining stationary, or deteriorating, it is highly important that the nation should know the true state of affairs, and this can only be achieved by means of a physical census of representative parts of the population.

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* Report of the Inter-Departmental Committee on Physical Deterioration, 1904.

In the evidence and in the Recommendations of the Inter-Departmental Committee, the Council finds support for its views as to the need for a physical survey.

(2) At the meeting of the British Association, held at Cambridge in 1904, a discussion took place on the "Alleged Physical Deterioration of the People." This discussion, with papers read by the late Professor D. J. Cunningham, the late Mr. John Gray, and Dr. F. C. Shrubsall, was published by the Royal Anthropological Institute as Occasional Paper No. 2 (1905), and a copy is enclosed (Enclosure A). The urgency of an Anthropometric Survey was conceded by all, and plans were formulated for carrying out such a survey. Amongst those who took part in the discussion was Dr. Ridolfo Livi, who had been entrusted by the Italian Ministry of War with the drawing up of a report upon measurements made on 300,000 conscripts drawn from all parts of Italy. Dr. Livi's report gave Italy an initial basis on which future comparisons may be founded, and at the same time threw a flood of light on the physical condition and racial constitution of the Italian people.

Causes tending to produce physical changes in the population.—Another reason for urging the necessity for a survey is based on theoretical considerations. The conditions under which the British people now live differ profoundly from those which prevailed some centuries ago. Their food has changed, their houses and surroundings are different; their modes of life and of livelihood are new. At present it is only possible to speculate as to whether these altered conditions are effecting a physical change amongst the mass of the population. In the course of time a physical survey would provide the means of assessing the extent and nature of the changes, if such there are.

Organization and Scope of the Survey.

So far, only the reasons for urging the institution of an anthropometrical survey or physical census have been put forward. The Council ventures to assume that the Board of Scientific Studies will agree that such a survey is needed, and that it will be desirous of convincing the Government that a survey ought to be initiated. The manner in which it could best be carried out would then have to be determined. This practical question has already been investigated, and definite suggestions put forward, both in the Report of the Inter-Departmental Committee and in the papers contributed to the Discussion at Cambridge. (See Report, Part I, page 8.)

Broadly speaking, three preliminary problems have to be solved:

(1) The selection of representative sections of the population. (See below, "Scope of the Survey.")

(2) The measurements and observations to be made. (See below "Scope of the Survey.")

(3) The organization required for making, collecting, analyzing and preserving the records.

It will be convenient to consider the last question first in order.

Use of the Military Organization.—The Council feels that it is not desirable to enter into administrative questions in any great detail at present, especially as many of them can only be settled when the scheme becomes one of practical politics. It may be pointed out, however, that a very great change has come about since the Inter-Departmental Committee issued its Report—a change which makes a survey of the manhood of the people more feasible than it ever was before. The organization which war has rendered compulsory could provide the anthropological data as regards the chief constituents of the population, without detriment to military service; nay, an accurate survey should be of military advantage. It is probable that during the assemblage of the present armed forces of the country, statistics relating to the physical condition of the nation's manhood have been accumulated, but in view of the hurried conditions under which recruiting had to be carried on, and the diverse methods employed by medical officers at the time, it is unlikely that such statistics could serve as a standard basis. Were, however, some kind of compulsory service to remain in force, and were medical officers, trained in a uniform system of observation, placed in charge of the examination of recruits in selected areas of the country, there could be obtained through the Army organization such data as are required for an anthropometrical survey.

Use of medical examination in schools.—The organization for the collection of data relating to school children is already more than foreshadowed. To make the existing arrangements effective for the purposes of a survey, it would be necessary for the medical officers to be trained systematically in the employment of uniform methods of measurement and record.

The Central Organization.—A very important and also very difficult matter is the constitution of a central body, to be responsible for the manner in which the survey is carried out, for the determination of its scope, and for the collection, systematization and publication of the records. The Inter-Departmental Committee recommended the adoption of a scheme which was formulated by Professor D. J. Cunningham (Report, Part I, p. 8). In that scheme it was proposed that there should be:

(1) A Consultative Committee, consisting of three leading anthropologists, the appointments to be honorary and unsalaried. They were to be advisers, but their powers were not defined.

(2) A Central Bureau, under the control of a paid Director, with a staff of assistants, including a statistical department.

(3) A staff of trained "surveyors" or "measurers." It was also proposed to train teachers as surveyors, paying them a gratuity for their services.

Estimates were given of the cost of such a staff, varying from £4,000 to £10,000 per annum.

It was apparently intended by the Inter-Departmental Committee that the anthropometric survey should be affiliated to the Local Government Board.

If the Council is right in its anticipation that some form of general military service will be maintained throughout the country, then it is clear that the recommendations which were valid for the conditions of 1904 do not apply to those which are likely to prevail in coming years. If, however, there is a reversion to pre-war conditions, then the scheme proposed by the Inter-Departmental Committee, or a modification of that scheme, would have to be considered.

In the event of its being decided that the manhood of the nation is in future to be registered and medically examined for military service, it is clearly through the Ministry for War that a physical census of the adult males would have to be carried out. It is equally clear that in any case a survey of the school children would be made through the Ministry of Education. Neither of these Departments of State would be likely to allow a central bureau, such as is mentioned above, to use their officers to carry out an anthropometrical survey. Each Department would, no doubt, set up its own organization, not only for the collection of data, but also for its treatment and publication. It would probably, however, be possible to co-ordinate the work by setting up a small Advisory Board, with powers to advise the responsible Ministers as to the manner in which the survey should be carried out, and to recommend, from time to time, such changes as might be necessary. On such a board there would need to be two or three skilled anthropologists, a statistician, and a representative from the Admiralty, the War Office, the Board of Education, the Local Government Board, and the National Health Insurance Committee, respectively.

Scope of the Survey.—The Council feels that it is at present only possible to touch upon the two other main questions that will have to be considered, since they are clearly matters which must be finally settled by the Advisory Board. These questions are:

(1) The selection of sections of the population for examination, and the proportion which these sections must bear to the population as a whole; and

(2) The number and the nature of the observations to be made on each individual examined.

It is obvious that the first of these questions is a matter for statisticians rather than for anthropologists, and it may therefore be left on one side.

As regards the observations to be made, it is clear that they must be as few in number as is compatible with the end in view, and that all of them must deal with characters which are capable of exact measurement. The Council would recommend the following list, which is essentially that selected by Professor Cunningham (see Report, Part I, page 9). This includes:

(1) Stature.
(2) Sitting height.
(3) Chest girth (maximum and minimum).
(4) Weight.
(5) Head (length, width, height).
(6) Breadth of shoulders.
(7) Breadth of hips.
(8) Vision tested by Snellen's type.
(9) Colour vision.
(10) Degree of pigmentation.

Evidence to be obtained from ancient interments.—There are already grounds for supposing that, in comparatively recent centuries, a definite change has occurred in the physical constitution of a large proportion of the British people. A past President of the Royal Anthropological Institute, Dr. Arthur Keith, has instituted an elaborate comparison between the teeth, jaws, and facial skeleton of 50 men and women who lived in England prior to the Norman Conquest, and of 50 men and women of the 18th Century, and has come to the conclusion that the differences between them are such as cannot be accounted for by a difference in racial constitution. In the last thousand years the facial parts of the English people have altered. The Council mentions this circumstance because it points to another source of evidence supplementary to that to be derived from an anthropometrical survey. In every district throughout the country ancient burials are from time to time discovered. In a great number of cases it is possible, with expert advice, to determine approximately the period at which these interments were made, and the human remains will then provide accurate data relating to the physical condition of the people of the period. At present, the bones are in most cases neglected and cast away, valuable records being thus lost for all time. In the opinion of the Council, it should be compulsory for any one making a discovery of human remains in an ancient burial to report that discovery to the

Coroner of the district, or to a corresponding officer, and such officer should be under instructions to see that the remains are preserved and examined, a report being forwarded to a central bureau. If this were done over a period of years a basis would be provided on which to found definite conclusions as to changes affecting the physical constitution of the people during recent centuries.

The Effects of the War on the Population.

There is another anthropological matter which will require investigation when the war is over, but it is one which must be regarded as totally distinct from an anthropometrical survey. It will be necessary to ascertain how the mortality of the war has affected the manhood of the nation; the distribution of the loss in its relation to counties and cities; the percentage of loss as affecting various classes of the community, and particularly how far the losses have affected the persistence of family strains. Such an enquiry would fall most naturally on the Local Government Board, or on the Ministry of Health, were such a Ministry established.

Fate of the Recommendations of the Inter-Departmental Committee.

In conclusion, the Council thinks it may interest the Board of Scientific Studies to know the fate of the Recommendations issued by the Inter-Departmental Committee in 1904. In order that these recommendations might not be shelved and forgotten, the Royal Anthropological Institute organized in June, 1905, a powerful deputation to wait on Lord Londonderry, then Lord President of the Council. The deputation urged on him the need of carrying out the steps recommended by the Committee. A discussion followed in the House of Lords (July 20th, 1905). Lord Londonderry, replying on behalf of the Government, whilst approving of an Anthropometrical Survey, appeared to think that there would be a difficulty in carrying it out *because parents might object to their children being measured.* In short, the labours of the Inter-Departmental Committee, and the endeavours of a generation of anthropologists, were cast aside because the Government of the day feared to face the prejudice and ignorance of a small part of the population.

We are, dear Sir,

Your obedient Servants,

(Signed) H. S. HARRISON,
T. A. JOYCE,

Hon. Secretaries of the Royal Anthropological Institute.

January, 1917.

APPENDIX C

Graduated Numbers of the Male Population of the Continental United States, Ages 18-49, by Single Years of Life and Conjugal Condition, Estimated for the Year 1918

Ages	Total	Single	Married	Widowed and Divorced
18	1,065,265	1,072,646	18,208	300
19	1,056,291	1,005,700	61,198	808
20	1,050,095	931,707	109,245	2,325
21	1,046,598	849,661	166,397	3,842
22	1,040,202	766,104	237,709	5,658
23	1,031,708	685,568	322,678	7,477
24	1,021,315	610,568	396,014	9,296
25	1,007,924	543,622	453,671	11,216
26	990,236	477,179	502,730	12,732
27	970,849	416,273	541,674	14,247
28	949,763	363,925	571,514	15,662
29	927,278	318,623	593,768	16,874
30	902,994	280,871	608,435	18,087
31	876,712	248,153	616,021	18,895
32	851,229	219,966	616,527	19,704
33	816,452	196,811	611,469	20,512
34	802,662	176,677	603,883	21,421
35	779,577	160,570	597,814	22,230
36	768,285	148,993	596,296	23,341
37	756,093	141,442	595,265	24,655
38	743,102	135,905	592,756	26,171
39	729,011	129,865	586,181	27,787
40	714,121	121,812	571,514	30,718
41	679,544	112,248	551,789	32,940
42	645,667	101,677	521,949	35,467
43	612,789	89,597	487,051	38,195
44	580,810	79,027	457,717	41,226
45	549,631	70,973	435,969	44,561
46	543,833	63,926	420,796	48,198
47	538,938	57,382	413,715	52,038
48	534,941	52,349	408,658	56,282
49	531,643	48,825	404,612	60,829

NOTE.—The actual age returns, by single years of life, according to the Census, include numerous inaccuracies in matters of minor detail. It has therefore seemed advisable to graduate the data in conformity to standardized methods of statistical practice. The combined totals for the three groups, by conjugal condition, varies slightly from the estimated graduated total, but the differences are relatively unimportant. The estimates are, of course, without reference to the effect of the first and second selective drafts, and the mortality of the American forces at home and abroad since the outbreak of the war.

APPENDIX D

Two Letters on Unnecessary Rejections on Account of Deficiency in Stature (New York *Sun*).

To the Editor of The Sun—*Sir:* Evidence is not lacking that the military-service rule requiring a height of 63 inches on the part of applicants for admission is depriving Uncle Sam of the fighting ability of thousands of young men who are eager to go to the front and help the good cause.

Why is it that the military authorities at Washington continue to bewail a shortage of men of draft age for active service and threaten to change the limit of the draft age from 31 to 40 years, when there are thousands of young men of draft age, fine specimens of manhood physically, mentally and morally, courageous and fearless, all anxious to do their bit, and do it with a vim?

With every branch of the service urging early enlistment, with boys in the colleges enrolled for service just as soon as the emergency arises, why, with all this, is a man of sound mind and healthy body refused for the National Army because he happens to be less than half an inch below the required height of 5 feet 3 inches?

Take my case as an example:

I am a young man, 31 years of age, a graduate of the College of the City of New York, post-graduate student at New York University, former athletic director of playgrounds, former principal of vacation playgrounds, a man who has devoted fourteen years to athletic pastimes, and has made a close study of athletic conditions and methods.

In addition, I also have had considerable military training both as a member of a cadet corps and a member of the Newspaper Men's Officers' Training Corps. I was one of the organizers of the latter. I passed my physical and mental tests for the First Officers' Training camp at Plattsburg, except as to height, and although recommended for admission, was rejected because I lacked the required height. I tried to gain admission to the Second Officers' Training camp, but again was turned down because I was too short.

With two of my brothers in the service, one a first lieutenant in the infantry, A. E. F., and the other in the balloon photographic observation section of the Signal Corps, I was determined to try again to enter the active service. I applied for admission to the Marine Corps, but was informed by Lieutenant Gardner that the corps would be glad to have me because of my special training and experience, but that I was far too short for that branch of the service.

I then applied at one of the recruiting stations of the Regular Army and heard the same words repeated. That application was filed before the height regulations were reduced last July, and I finally decided to wait until called into the service through the draft.

Now for the real blow. After being placed in Class 1A and waiting patiently for my call, I was informed by my local board last week that the new army regulations forbade my induction into active service because I was only 62½ inches, or 5 feet 2½ inches in height. That I was informed is half an inch below the required height. My case was appealed to the Medical Advisory Board, where I was informed that I am 62⅝ inches in height, still short of the required minimum.

At that, I was given to understand I would be accepted for active work, yet today the local board chairman told me I probably would never see active service, as the requirements will not permit induction into any other but special service. I was told a definite decision has not yet been reached in my case, but that it was useless for me to build any hopes of being accepted.

This, mind you, despite the fact that I am as healthy, strong and vigorous as when I taught physical training to the boys of the south section of Brooklyn, where I was stationed by the Board of Education for four years. As there are plenty of sickly fellows ready to do clerical duty, why is it necessary to pick upon a healthy chap, fit for the real kind of war work? F.

NEW YORK, July 20.

TO THE EDITOR OF THE SUN—*Sir:* Regarding the letter on the editorial page of THE SUN of July 21 signed "F," and dated July 20, I beg to inform you that on Friday, July 19, all local boards in New York City were notified by telegram that the minimum height requirement had again been reduced to sixty inches and the minimum weight requirement to 110 pounds, the amendment being available for all classes.

The minimum height requirement was sixty inches up to June 5, 1918, when it was raised to sixty-three inches, and the minimum weight from 100 to 116 pounds. The latest change in physical requirements restores the minimum height to what it was June 5.

I venture to predict that if the only ground of rejection of your correspondent was his height, he will be inducted into military service of the United States very soon. MARTIN CONBOY,

Director of the Draft for the City of New York.

NEW YORK, July 23.